

HITCHCOCK'S *Machine Tool* BLUE BOOK

FOUNDED

MAY 1939

1905

HARDINGE MACHINE FOR SECOND OPERATION WORK

ACCURACY — FINE FINISH — HIGH SPEED — LOW COST



1" Collet Capacity—6" Step Chuck Capacity—36" Bed—Spindle Speeds 150 to 3900 R. P. M.

ARE YOU OVERLOOKING PRODUCTION POSSIBILITIES AFFORDED BY THESE FEATURES:
— extreme accuracy—high speeds with preloaded ball bearing spindle—large chucking capacity—lever operated collet
— taper—tilted turret with six independent stops—cross slide and turret taking standard Brown & Sharpe tools—oil
cutting facilities—electrical driving unit—lever speed control—spindle brake—welded steel cabinet with storage space
for attachments.

This is the ideal unit for completing additional operations on parts as they come from automatic screw machines.

ASK FOR BULLETIN BBSM FOR COMPLETE DETAILS.

HARDINGE BROTHERS, INC., — — — ELMIRA, N. Y.
CHICAGO — NEW YORK — PHILADELPHIA — DETROIT — HARTFORD

MARVEL SAWS

*Keep profits at home
with a MARVEL No. 8*

Not only will a MARVEL No. 8 save hours of machining time, roughing-out work...not only will it make all types of straight and angle cuts, notching, coping, mitring and an unlimited variety of work without special setting up...it will also keep profits at home, that without fail, outside. With a MARVEL No. 8 you can turn your own die plate dies from large stock billets etc...and turn warehouse cutting extra into extra cutting profits. With a No. 8 you can handle big work (up to 18"x18") and small work to the finest drill rod with ease. Equipped with both power and hand feeds, the blade is fed through the work (work remains stationary on table) Column tilts either right or left to cut any angle to 45 degrees. Automatic knock-off stops machine at any depth of cut desired.

The most economical saw built, the MARVEL No. 8 fills a definite place in the MARVEL line, the most complete line of metal cutting machines.



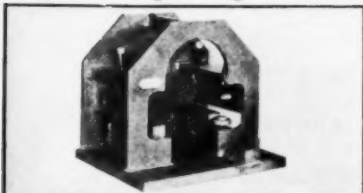
Send for Bulletin 800-A

ARMSTRONG-BLUM MFG. CO. "The Hack Saw People" CHICAGO
5741 BLOOMINGDALE AVENUE

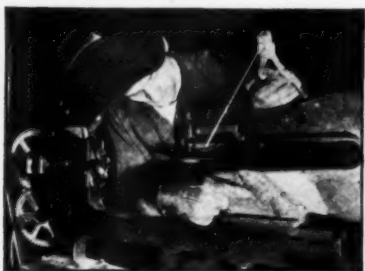


5741 BLOOMINGDALE AVENUE

DON'T MISS THESE BETS! Cut costs and improve quality with a LINCOLN Welder



BUILD JIGS AND FIXTURES—This boring and back-facing fixture was welded from steel plate at a saving of \$17.50. It's typical of thousands built with "Fleetweld" and a LINCOLN Welder. Ask for Bul. 409.



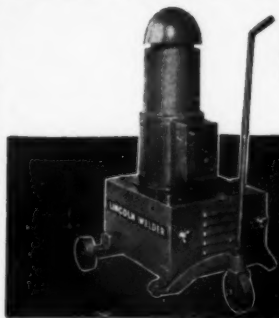
REPAIR BROKEN PARTS—This cast iron arm of a circular shear was cracked and repaired at a saving of \$30 with "Ferroweld" and a LINCOLN Welder. Ask for Bul. 401.



HARD-FACE TOOLS AND DIES—Four of these wheelbarrow stamping dies were reclaimed at a total saving of \$4800, with "Toolweld" and a LINCOLN Welder. Ask for Bul. 404.



PRODUCE WELDED PARTS—A shop changed this sprocket housing from the construction shown at the top to lighter, stronger welded steel and saved \$8.70 each with a LINCOLN Welder. Ask for Bul. 420.



NEW! Lincoln Machine Shop Welder with Self-Indicating "Job Selector" and Current Control assures maximum speed and quality for every job. Consult the nearest Lincoln office or mail the coupon.

THE LINCOLN ELECTRIC CO. Dept. AD-591, Cleveland, Ohio

☐ I am interested in welding _____
_____. Send bulletin. ☐ Send Bul. 314-A.

Name _____ Position _____

Company _____

Address _____

City _____ State _____

MEET MODERN COMPETITION

**MORE
PRECISION
WORK**

On Rivett 505

From the new 24 page bulletin the correct bench lathe or hand screw machine can be selected for your toolroom, production or experimental work.

The proper combination of spindle capacity, bearings, attachments, mounting and drive is a sure guarantee for **MORE PRECISION WORK.**

Write for Bulletin 505-E

RIVETT LATHE & GRINDER INC.
Brighton, Boston, Mass.

Lathe Assembly

Ball Turning

Milling

Thread Cutting

Grinding

RIVETT

MEET MODERN COMPETITION

With Chicago Steel Brake
Production Performance

36 Years' Experience..



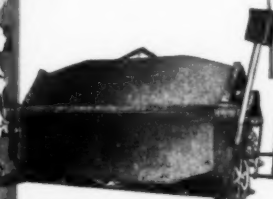
**BOX
AND PAN
BRAKE—**

Forms boxes or pans from one piece of metal. A straight brake as well as a box brake. Ideal for experimental shops.



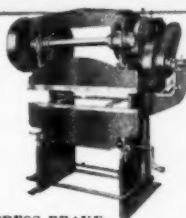
HAND BRAKE—

Improved to meet modern needs. Efficient and dependable — sturdy and durable.



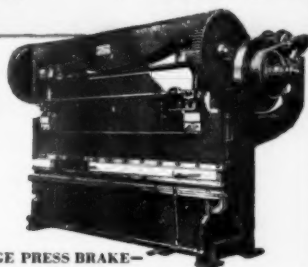
POWER BENDING BRAKE—

Indispensable wherever a volume of heavy plate work is done—forms a great variety of bends and shapes without dies.



SMALL PRESS BRAKE—

Compact, powerful money-saving production unit. Replaces cumbersome costly machines that are expensive to operate. Uses same dies as larger machines.



LARGE PRESS BRAKE—

The only press brake which turns out perfect work without shims and crowned dies. Patented non-deflecting bed equalizes pressure over the full bending length and overcomes major fault in solid bed press brakes.



**FORMING
PRESS DIES**

We manufacture any type of die required for forming presses. Our die department will quote on any type to meet your needs. Submit blue print or sample of work.

OVER 40,000

"CHICAGO" BRAKES in use by leading concerns—the world over

DREIS & KRUMP MFG. CO.

7440 LOOMIS BLVD.,

CHICAGO, ILL.

COLLETS-FEED FINGERS-PADS

FOR YOUR

AUTOMATIC and HAND SCREW MACHINES



*Write for copy of catalog 34
if you have
AUTOMATIC and HAND SCREW MACHINES*

MORRISON COLLETS, FEED FINGERS, MASTER COLLETS, MASTER FEED FINGERS AND PADS: for Brown & Sharpe, Cleveland, Cone, Gridley, National Acme, New Britain, Davenport, etc., Automatics.

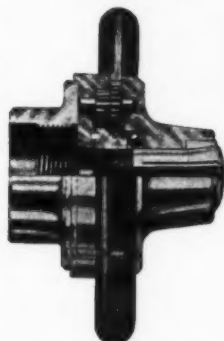
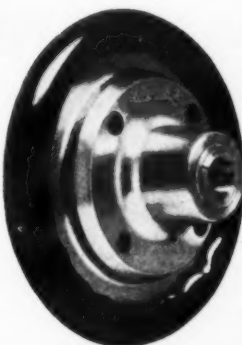
MORRISON COLLETS: for Bardons & Oliver, Cincinnati, Foster, Garvin, Pratt & Whitney, Warner & Swasey, etc., Hand Screw Machines.

Catalog No. 34 gives complete ordering information and lists attractive prices. Illustrates and describes Style "B" Morrison Master Feed Fingers and Pads which eliminate scoring of stock.

—STANDARD SIZES FROM STOCK—

MORRISON MACHINE PRODUCTS, Inc.,

Elmira, N. Y.



SJOGREN

PRONOUNCED (SHOW-GRIN)

SPEED COLLET CHUCK

For Your Tool Room and Engine Lathes

- Saves Time
 - Increases Capacity
 - Eliminates Keys and Wrenches
- Increases Production
 - Affords Greater Accuracy
 - Three sizes up to 1½" Capacity

"Saves Time and Increases Accuracy"



In use on Milling Machine

In use on Engine Lathe

The amazingly fast action of the Sjögren Speed Collet Chuck gives it full right to its name! An almost effortless turn of the handwheel, one way or the other, automatically opens or closes the collet, releasing or gripping the work as desired. Its grip is adjustable and sure. Most operators simply lay a hand on the wheel and run the lathe forward to tighten the collet . . . reverse to loosen.

METHOD OF MOUNTING: An intermediate plate is used to adapt the Sjögren Speed Chuck for machines with threaded nose spindle. It is mounted in the same manner as an ordinary 3 or 4 jaw chuck. Also, it is furnished complete, ready for use with machines having standard tapered key-drive or cam lock spindles.

With the Sjögren Speed Collet Chuck, the operator is always in front of his work and he stays there! There is no need to reach over—or to walk back of the lathe headstock—to grip or release material in the collet.

Through the increased production and machinist efficiency caused by the elimination of lost time and lost motion, the Sjögren Speed Collet Chuck more than pays for itself! Write today to the nearest distributor

FURNISHED WITH HARDINGE PRECISION COLLETS

• DISTRIBUTORS •

Ray H. Morris & Company, Inc.	7 South Main Street	West Hartford, Conn.
Hardinge Sales Company, Inc.	277 Lafayette Street	New York, New York
Wright & Gads Equipment Co.	3701 North Broad Street	Philadelphia, Pa.
Hardinge Brothers, Inc.	1418 College Ave.	Elmira, New York
W. W. Wentz	113 Powers Building	Rochester, New York
William K. Stamets	Jenkins Arcade Bldg.	Pittsburgh, Pa.
Cleveland Duplex Mch. Co., Inc.	Penton Building	Cleveland, Ohio
E. A. Kinsey Company	331-335 W. Fourth St.	Cincinnati, Ohio
Iverson & Laux	544 W. Washington Blvd.	Chicago, Illinois
F. A. Durnell	709 Carlisle Place	Indianapolis, Indiana
National Sales Engineering Corp.	2970 W. Grand Blvd.	Detroit, Michigan
Northern Machinery & Supply Co.	Lumber Exchange Bldg.	Minneapolis, Minn.
Colcord Wright Mch. & Supply Co.	1223-1229 N. Broadway	St. Louis, Missouri
C. H. Gosiger Machinery Co.	Bacon & McDonough Sts.	Dayton, Ohio
Moore Machinery Company	550 Fifth Street	San Francisco, Calif.
Eccles & Davies Machinery Co., Inc.	1910 Santa Fe Ave.	Los Angeles, Calif.

SJOGREN MANUFACTURING COMPANY

DRILL 75% FASTER

*Drills Stay Sharp
Longer!*

**in concrete, tile,
brick, slate, plaster,
limestone, marble,
glass, carbon,
asbestos,
etc.**

(Patented)

A Carbide Tipped Drill

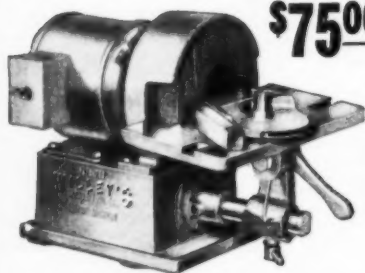
specially designed for drilling holes in non-metallic materials, such as concrete, tile, brick, slate, plaster, limestone, marble, asbestos, wallboard, asphalt, glass, carbon, etc. It can be operated in a drill press, electric drill or hand brace at any number of revolutions per minute. No coolant is necessary.

The tip of the drill approaches the hardness of diamonds, yet it can be sharpened on any type and make of grinding machine and grinding wheel. Maintenance engineers find this drill useful for installing machines, as well as for many other applications.

New!

*Write for
particulars.*

Willey's Tungsten Carbide Tool Grinder



\$75⁰⁰

A modern bench grinder for sharpening Tungsten Carbide Tools and Willey's Masonry drills . . . quickly and economically.

The entire unit is compact and rigid. The size of the base of the machine is 8"x9". Height 10½", and the surface feet of the grinding wheel is approximately 5000 FPM. The grinder is self contained and provided with a reversible switch located inside the base and controlled by finger tip lever on the outside.

Write for full details.

WILLEY'S CARBIDE TOOL CO.

1344 W. Vernor Highway,

Detroit, Michigan



Production that PAYS Dividends

The four 4-spindle No. 16 Buffalo Drills pictured above are paying big dividends in the plant of a Connecticut Instrument Manufacturer. Piece parts requiring as many as 16 different operations of drilling, reaming, spot facing, counterboring, countersinking and tapping go through this efficient production line with a minimum of effort and expense.

High production and low cost call for the best of planning and tooling. But unless the Drilling Machines are capable of trouble free and accurate operation, the expense of planning and tooling is wasted. The machines pictured above have been on high production schedules for five years. (manufacturer's name on request).

For nearly forty years, "Buffalo" has been solving drilling problems.

May we help you?

BUFFALO FORGE COMPANY
161 MORTIMER ST. BUFFALO, N. Y.
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

"Buffalo"

Sensitive Sixteens

one of a complete line of Production Drills

One Tool Sold Another!

...now this ONE plant uses

SKILSAW TOOLS

on Five operations!



1 Sanding spot welds, cleaning metal before enameling, smoothing raised metal parts—using SKILSAW Model "G" Disc Sander.



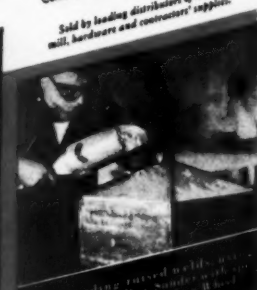
2 Final sanding and surfacing of conveyor parts table tops—using SKILSAW Model "A" Belt Sander.



3 Drilling hole centers for gas pipe outletting—using SKILSAW 3/16" Drill.



4 Drilling lead holes for screws and bolt holes in assembly of punch with SKILSAW 3/16" Heavy Duty Drill.



5 Grinding raised welds with SKILSAW Disc Sander with specially designed Grinding Wheel.

Could you ask for better proof of the cost-cutting performance of SKILSAW TOOLS? Annetaberger Bros., Chicago, manufacturers of bakery and brewery equipment have made these 5 operations (slow and costly when done by hand!) fast and profitable by the use of SKILSAW TOOLS... each tool's performance had led to the purchase of another until today a large number of SKILSAW TOOLS are saving money and increasing production throughout the plant! Ask for a free demonstration of SKILSAW TOOLS on your own work... and you'll see why they belong in YOUR plant!

SKILSAW, INC.

5035 Elston Ave., Chicago

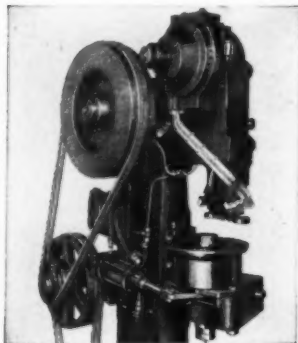
714 E. 40th St., New York 18 Brooklyn Ave., Boston 1495 Spring Garden Philadelphia 2124 Main St., Dallas 218 Union St., New Orleans 1823 S. Flower St., Los Angeles 3035 Wheeler Avenue, Oakland Canadian Branch: 85 Denison Ave., Toronto.

Sold by leading distributors of mill, mill, hardware and contractors' supplies.

the RIVITOR

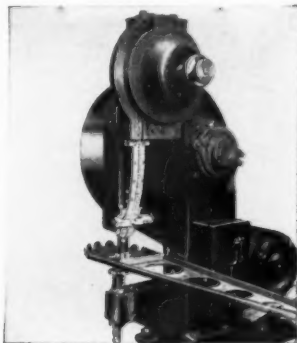
already serves these industries - - -

AUTOMOTIVE..



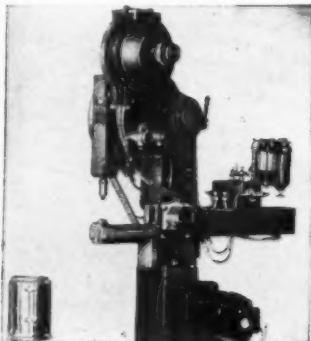
The Rivitor is shown here setting two solid rivets at a time to attach cushion springs to driven clutch plate assemblies.

AIRCRAFT...



This is the standard "BR" Bench Type Rivitor tooled for setting $\frac{1}{8}$ " diameter x $\frac{1}{4}$ " long duralumin rivets in airplane sections.

UTENSIL...

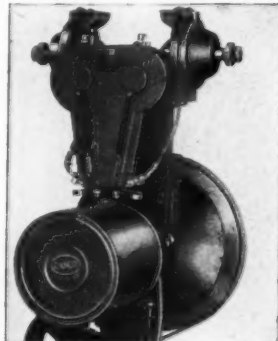


The Rivitor is shown here setting aluminum rivets to attach handle brackets to bodies of percolators.

The Rivitor ably handles not only these jobs in these industries, but many jobs in these and other industries, wherever there are solid rivets to be automatically fed and set to obtain a stronger joint—better—faster.

Send for our new Bulletin R-1A. This will give you more information on the Rivitor in these industries.

CONTAINER...



This Rivitor sets two rivets at the same time to attach handle brackets to paint pails.

TOMKINS-JOHNSON CO.

605 N. Mechanic St.,

Jackson, Mich.

Agents in principal cities in United States

European Representative—Gaston E. Murhais, Ltd., London

30 DAYS TRIAL

Hobart at our risk on your work with no obligation. It proves that it saves money and it pays for itself.



With a HOBART you get...

LOWER WELDING COSTS

and you can have 30 DAYS TRIAL TO PROVE IT!

There's never any need to take anyone's word about the cost-saving features of the new Hobart 40-Volt "Simplified" Arc Welder when you can try it in your own shops, on your own work and under your own conditions for one solid month... at our risk! If it takes more than words to convince you of the money saving possibilities of the new Hobart Welder, then here is your opportunity to satisfy yourself.

Every Hobart feature has a vital part in lowering welding costs. They save time, current costs, extra work and give you better quality welding. The exclusive Hobart Remote Control saves time and energy; the Multi-Range Dual Control gives you

1,000 possible combinations of voltage and current instantly available; ideal stabilization assures smooth, uniform current with all electrodes... but to really appreciate the Hobart welder you must use it yourself! Remember, with the Hobart you can try before you buy! Send coupon today for the complete details.

HOBART BROS. CO., Box TB-59, Troy, Ohio

"One of the World's Largest Builders of Arc Welders"

HOBART BROS. CO., Box TB-59, Troy,

Without obligation send me full information about new Hobart cost-saving Arc Welder, particularly the items checked below:

☐ Electric Drive ☐ Gas Drive ☐ "Build Your Own" I'm interested in _____ Amp. Capacity.

To be used for _____

Also information on ☐ 30 Days Trial, ☐ Easy-to-Own, ☐ Renting a new welder with purchase privileges, ☐ Two-bush I've checked, ☐ Carbon Arc Cutting, ☐ New Hobart line, ☐ New Profit in Arc Welding.

NAME _____

FIRM _____

ADDRESS _____

HOBART

FREE! GET THESE VALUABLE BOOKS ON "SIMPLIFIED ARC WELDING" ... MAIL COUPON TODAY





A file cut bur is being used to blend two castings with a Kellerflex JF-3 Machine. This is only one of many assembly applications for which this machine is adapted.



The Kellerflex JF-3 Machine is mounted on an adjustable floor stand. It is shown below with the column raised to about one-half its maximum working height.



Slash Assembly Costs with KELLERFLEX

Fast . . . powerful . . . versatile . . . efficient—the Kellerflex JF-3 Multi-Duty Machine is ideal for assembly department operations. Just as its name implies, this is an all purpose flexible shaft machine designed for a wide variety of fast and efficient filing, grinding and finishing operations. It operates with the same smooth efficiency whether it is used for heavy duty grinding or for light polishing, and on any individual job it is fully as satisfactory as a single purpose machine designed particularly for that job. It can be moved with ease from one department to another, and the speed can be adjusted quickly to suit the job at hand.

This machine can be used with grinding wheels, sanding and polishing drums, wire brushes, burs and rotary files, pencil stones, mounted points, cup wheels, felt and leather wheels, etc. To enlarge its usefulness we can supply a wide variety of attachments.

Let our engineers show you where Kellerflex will eliminate many of your assembly problems. Write today for detailed information on this machine.

PRATT & WHITNEY
Div. Niles-Bement-Pond Co., Hartford, Conn.
Kellerflex Sales Department

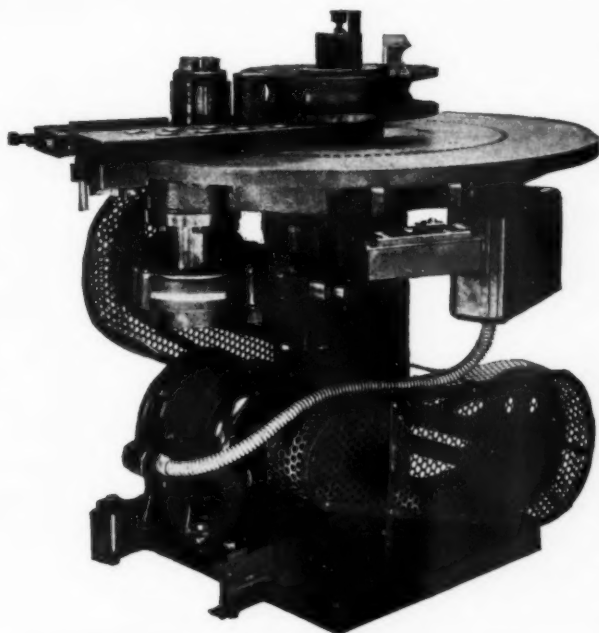
Pedrick

BENDING MACHINE

"COMPRESSION BENT"

FOR STRUCTURAL AND STAINLESS STEEL SHAPES, PIPES AND TUBING.

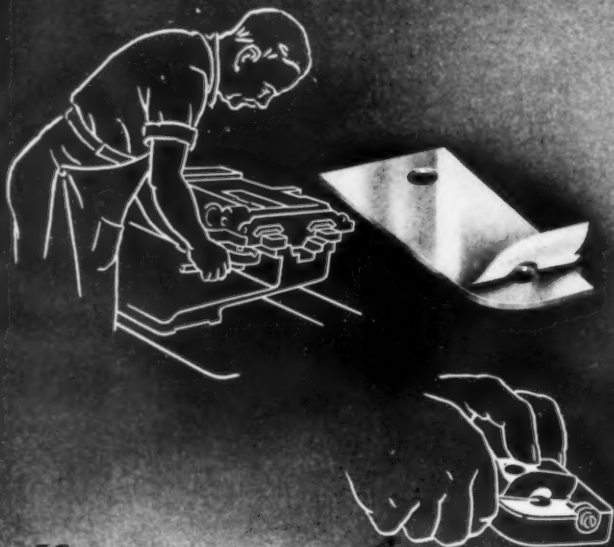
This machine, based on 30 years of manufacturing experience, bends on the compression principle, thus reducing internal stresses to a minimum. It is rugged, serviceable and of low first cost.



The Pedrick Bending Machine bends Structural Steel, Stainless Steel, hard drawn copper, Monel Metal, bronze, brass, Structural Aluminum, Molybdenum Steel tubing, pipes and anything that is bendable.

Do not hesitate to send for information.

THE PEDRICK TOOL AND MACHINE CO.
3640 N. LAWRENCE ST., PHILADELPHIA, PENN.



If you save *only* minutes

Every minute is *worth* saving in assembly or service adjustments. In precision machine tools, for instance (and in aircraft, where assembly cost is subordinate to *accuracy*) Laminum shims not only are reducing adjustment time and labor—they afford a degree of precision which makes older methods a costly luxury. • You simply *peel* laminations (each .003 or .002 inch or less in thickness) from the "solid" brass Laminum shim as required. No filing, grinding, machining!

We furnish Laminum shims—any quantity—cut to your specifications. For maintenance use, Laminum shim stock in sheets is obtainable from your mill supply house.

LAMINATED SHIM CO., INC. 21-82 44th Ave., L. I. City, New York, N. Y.
Cleveland Dallas Houston Milwaukee Tulsa

1167

Application Chart FREE

Write us for our new file folder (illustrating the many types of bearings in which LAMINUM shims find application. For handy practical use. With it a sample of Laminum.



LAMINUM
THE SOLID SHIM
THAT *peels* FOR ADJUSTMENT

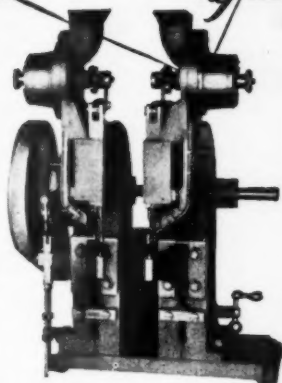
Adjustable Centers

MULTIPLY ITS USES

ALSO SETS
1 or 2 RIVETS
AT A TIME
Automatically

● This new Chicago Multiple Rivet Setter with adjustable centers is the last word in adaptability. Riveting centers can quickly be adjusted in or out and horns holding anvils raised or lowered, permitting virtually unlimited assembly applications. *Gives you advantages of volume savings on limited output.*

If you are interested in lowering both unit costs and capital investment, send blueprints or sample assemblies for production analysis of your products.



Type 55—For setting 1-8 inch body diameter tubular or split rivets.

●
Be sure to send blueprint or sample assembly with your inquiry.

Chicago RIVET & MACHINE CO.

1855 So. 54th Avenue

CHICAGO, ILLINOIS

Tubular and Split Rivets in All Rivet Metals

COSTS MORE DOES MORE Worth the Difference!

Beginning with the very materials with which it is made, The Haskins Tapper justifies its higher *original* cost. Manufactured almost entirely in the Haskins plant by specially developed methods and machines, it combines construction and design features not to be found in any other tapper. It is more finely engineered—thus more capable of *precision* performance.

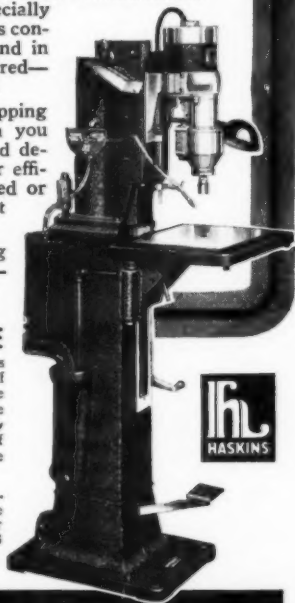
What does this mean in terms of *your* tapping problems? The fastest *precision* production you have ever obtained. Longer machine life and dependability. Less "down time." Greater labor efficiency. Less tap breakage and fewer spoiled or rejected parts. In short—increased output at lower unit costs.

With all these advantages it is not surprising that the Haskins Tapper *does* cost more—nor that it is proving itself *more than worth the difference!*

COMPLETE ENGINEERING SERVICE

The specialized tapping experience of Haskins Engineers is always available to every user of The Haskins Tapper. Through this complete engineering service, which helps you find the simplest and most efficient way to handle *every* tapping job, you are certain of getting out of your Haskins Tapper all the superior performance *built into it!*

A FREE BOOKLET—"Precision Tapping at High Speed"—gives complete details about The Haskins Tapper and the uniquely efficient Haskins Tapping Method. Write today for your copy. No obligation. R. G. Haskins Company, 623 S. California Avenue, Chicago.



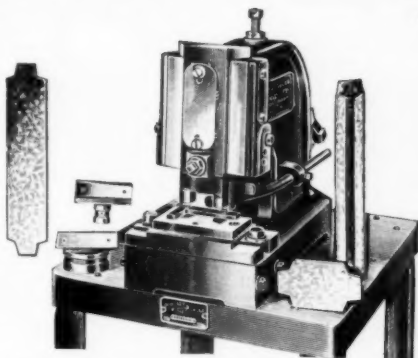
HASKINS

PRECISION
*Tapping
Equipment*

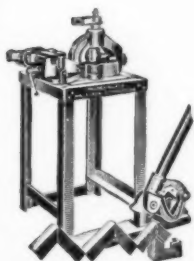
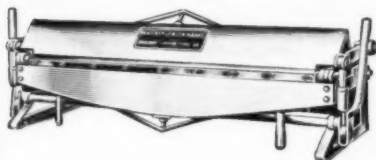
WHITNEY TOOLS

Here are just a few of the more than 80 different types of punches, presses, brakes and metal working equipment items in the WHITNEY Line.

At the right is shown our regular No. 28 Foot Press equipped with notching punch and die for making drive cleats, used in air conditioning work. One customer says this equipment repaid its cost during the first month.

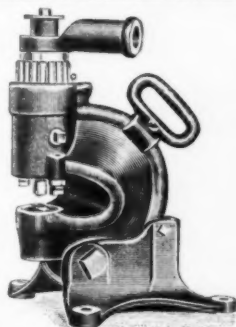


Here in the Whitney Jensen "Air Conditioning Special" Portable Brake. The bench type can be converted quickly into a floor type by the addition of a sub-base, attached with four bolts. It is quickly adjustable for different gauges—capacity 49 inch width, 20 ga. stock. Jaws are of welded steel plate, box type. Weight, only 265 lbs. Has every feature of a standard brake.

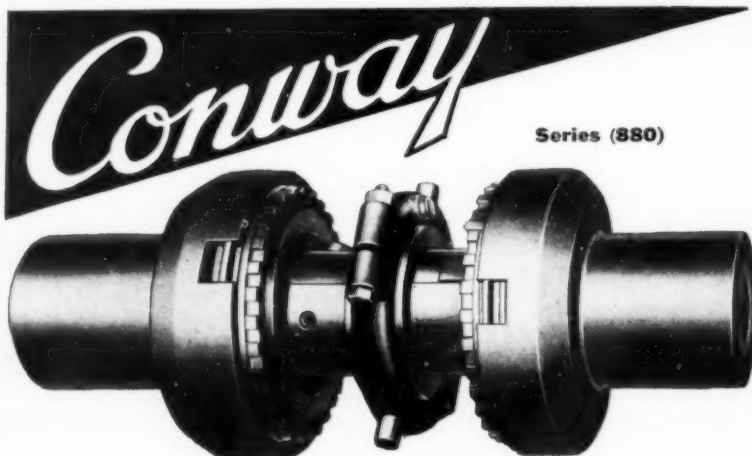


No. 455
Angle Iron
Combination
Capacity
2"x2"x1/4"
Angle Iron
or Smaller

No. 40 Ball Bearing Punch — Capacity 5/8-inch hole through 5/8-inch iron. Depth of throat 3 1/2 inches. Height of throat 2 inches. Furnished complete with one punch and die—sizes 1/16ths to one inch by 1/16ths — with or without base shown.



WHITNEY METAL TOOL CO.
ROCKFORD, ILLINOIS



Conway

Series (880)

Double Clutch with Extended Sleeve . . .

This is the Clutch for installations where changes of speeds, forward and reverse, or Clutch and brake action are required.

The Series 800 gives performance typical of all CONWAY Clutches with smooth, easy engagement—instant release—and free idling without drag.

Throughout the whole broad field of Clutch application in industry, there's a CONWAY Clutch for every need—the product of intensive Clutch experience and proven by every day performance in actual service.

What's Your Problem?

Let us help solve your Clutch problems—without any obligation on your part. Tell us your requirements. Send for the Bulletins in which you're interested. Bulletins P-24, L-28 and XYZ cover CONWAY Disc Clutches—No. 36, Compression Clutches—and K-32, One Revolution Clutches.

Patented in U. S. and Canada

THE CONWAY CLUTCH CO.

1541 QUEEN CITY AVE.,

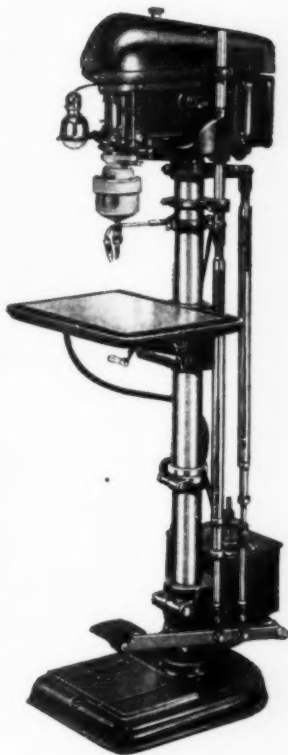
CINCINNATI, OHIO

TESTED--DEPENDABLE TAPPERS

The value of a machine in the modern plant is tested by its ability to produce a high comparative output accurately, dependably and economically. PROCUNIER Universal tapping machines are setting a new pace for production, with tested accuracy, dependability, economy and flexibility.

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FOR PUNCHING EXTRA LARGE STRUCTURAL SHAPES AND MANUFACTURED PARTS

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See how these BEATTY specifications compare with your requirements:

	No. 13	No. 14	No. 15
Face of slide, r to l, St'd.....	12½"	12½"	13"
" " " Maximum.....	24	24	34
" " " front to back.....	48	60	60
Die space.....	42	48½"	48½"
Stroke.....	2	2½"	3
Throat.....	25	28½"	34
Face of table, front to back.....	46	60	64
" " " r to l, St'd.....	22	22	28
" " " Maximum.....	30	34	38
Capacity.....	200T	300T	400T
Shipping weight, lbs.....	42,000	57,000	76,000
Motor required, H.p.....	7½	10	15
Spacing table to suit requirements			

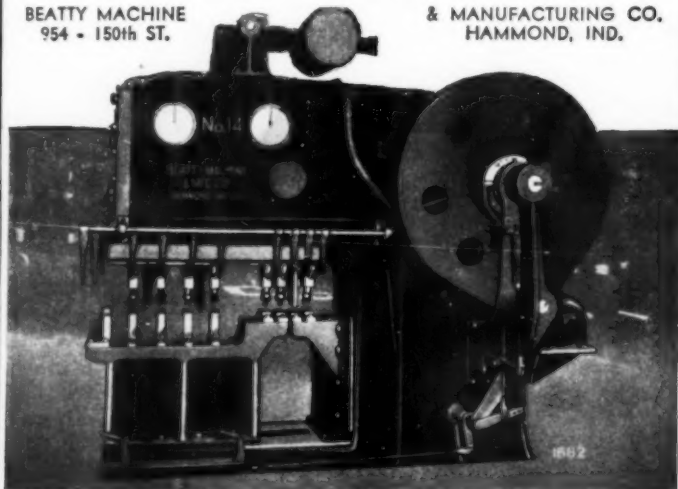
Punching capacity

2 holes 1½" thru 1" 4 holes 1½" thru ¾" 4 holes 1½" thru 1"

Send for Folder 1500-A giving full information.

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MOTOR—Full $\frac{1}{2}$ HP, ball bearing, repulsion induction, 1725 RPM.

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CASING — Improved, reinforced, rubber bound, with hardened alloy steel removable ends and ball bearing swivel end.

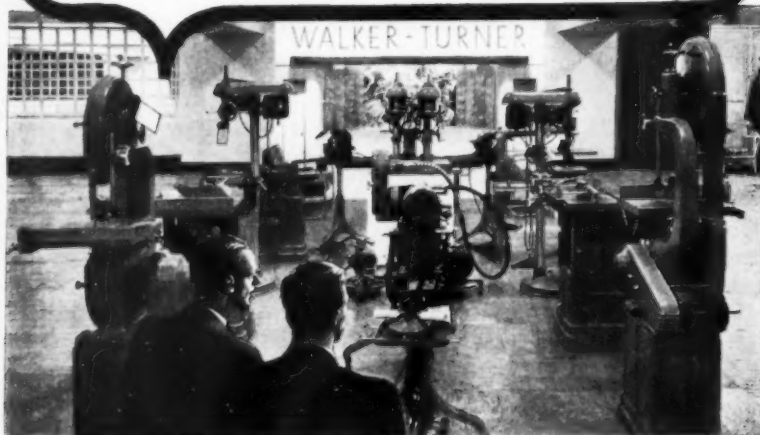
SPINDLE—Full ball bearing, accurately balanced, dust and grease sealed.

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EQUIPMENT

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AT LAST! Light Machines Built FOR INDUSTRY!



At the New York Power Show and the recent Detroit Tool Show, the industrial world has had a first view of something brand new—light machines built solely for industrial service. Bench band and jig saws . . . drill presses . . . flexible shaft machines . . . bench grinders . . . wood-working tools that no man could confuse with "home-craft" tools.

Walker-Turner exhibits have been kept busy by enthusiastic industrial men. All took hats off to Walker-Turner for meeting the need for an

entirely new class of machines: *light machines* to handle industry's new policy, "Run light work on light machines to cut costs".

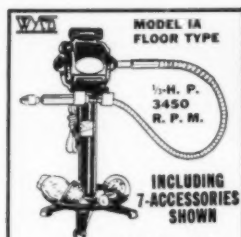
Don't fail to write—now—for the new Catalog which describes these new aids to production economy, and the older Walker-Turner lines, which will be continued, to give Walker-Turner the most complete range in the world. Better, ask your local Walker-Turner distributor for a demonstration. Walker-Turner Co., Inc., 1759 Berckman St., Plainfield, N. J.

Cut Costs...Run Light Work on

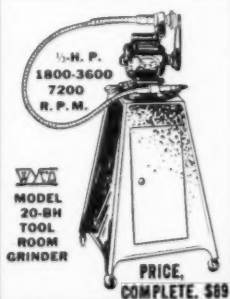
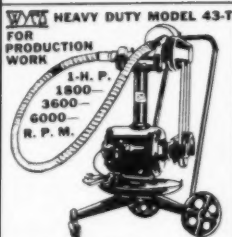
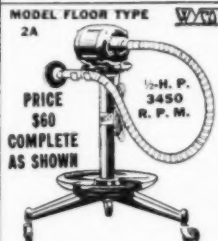
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YOU ARE MONEY AHEAD WHEN YOU BUY DURO DRILL PRESSES

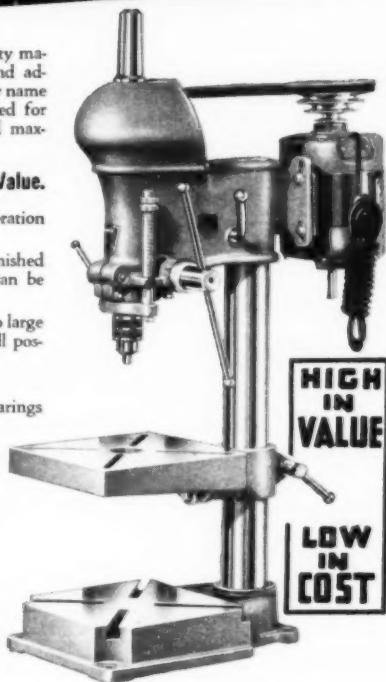
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1. Extra weight in castings to withstand vibration under heavy loads and high speed.
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3. 4-step pulley independently mounted on two large New Departure Ball Bearings eliminates all possibility of strain on the spindle.
4. Extra sturdy $2\frac{3}{4}$ " steel column.
5. Large New Departure Sealed Ball Bearings provide proper support to insure free running of the six-splined spindle.
6. Rugged Base with "T" slots and heavy slotted table both machined and ground for accuracy.
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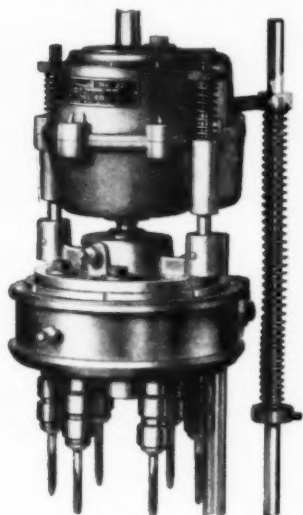


In Making this Precision Drill Press, Duro engineers incorporated extra strength for heavy work—precision machining and perfect balance for high speeds. Note the heavy six-splined spindle mounted on four sets of prelubricated, sealed New Departure Ball Bearings, with top bearings placed close to center line of pulley—all insuring exceptionally long life and smooth, trouble free performance.

MULTIPLE SPINDLE TAPPING AND DRILLING HEADS

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A STANDARDIZED SYSTEM

ETTICO MULTIPLE HEADS are manufactured. Hundreds of cases — thousands of gears are in stock.

Delivery service is at times within 24 hours.

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We specialize in fine intricate jobs, down to No. 60 drills or No. 1 taps. Let us have a drawing for a quotation. Even this is standardized with printed costs.

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Complete flexibility—of operation—of speed range—of location—these are all conspicuous benefits of Berkeley Motorizing Equipment. They're in addition to the direct dollar-and-cents' savings in operating cost.

Flexibility of operation means that the machines are engineered for the jobs, with just the right speed ranges under easy control—with the operation of each machine independent of all the others—with each machine located at the most efficient point in the production line. There's no "down time" to tighten belts. A turn of the "Tension-Trol" instantly adjusts belt tension—with enough take-up for many a day's stretch.

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KRW Hydraulic and Sensitive ARBOR PRESSES

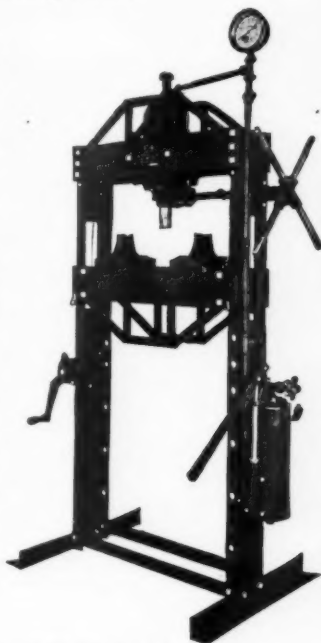
New Improvements, Special Built-in Features and Lower Prices make them an outstanding value.

THE last word in convenience, efficiency and ease of operation. Built extra strong and well braced, with steel trusses electrically welded, these presses will withstand strains that would cause presses of lighter and inferior construction to buckle or collapse.

Hand wheel for sensitive press operations has sliding handles which pull out to the ends for increased leverage. Work does not have to be changed from the work table as is the case with other make presses having a separate sensitive press unit mounted on the side or elsewhere.

The importance of this KRW feature as a time and labor saver can be appreciated. Also there is **NO EXTRA CHARGE** for this important built-in feature on a KRW Press. Work table can be raised easily with one hand. A strictly one-man Press.

Write for literature giving full details and specifications of all KRW Arbor Presses.



PRICES F. O. B. FACTORY, ARCADE, N. Y.

No. 37—35 ton Hydraulic and Sensitive Arbor Press.....	\$150.00
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Gauge and fittings, \$15.00 extra on all presses.	

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May we serve you?

HITCHCOCK PUBLISHING COMPANY,

508 South Dearborn St.

Chicago, Illinois

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CABLE ADDRESS "WICA"TORREDO TYPE
WHEEL DRESSING TOOLSBRANDON IMPREGNATED LAPS
FOR LAPPING HARDENED METALS

February 8, 1939.

Hitchcock Publishing Company,
508 So., Dearborn Street,
Chicago, Illinois.

Gentlemen:

You might be interested to learn that our advertisement on your January front cover has already produced well over five hundred (500) inquiries, and business resulting from these inquiries has produced sufficient orders to keep a hundred men busy approximately twelve hundred (1200) hours.

We are,

Yours very truly,

WILLEY'S
Carbide Tool Co.,R. G. Schneider,
Sales Manager.

RGS/EME

More than 26,000 copies of the BLUE BOOK are mailed monthly. Questionnaires indicate that these reach over 100,000 readers every month. And BLUE BOOK rates are lowest in the field for comparable circulation—and for actual orders produced.

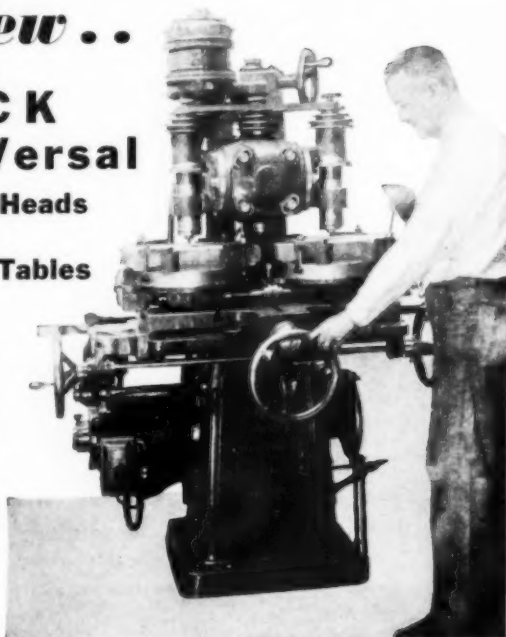
It's New..

THE **HACK** **Multi - Versal**

**with Twin Heads
and
Twin Turn Tables**

Here is the new **HACK** Multi-Versal at work routing out two battery grid molds at one time. Two high speed auxiliary heads are used in connection with twin turn tables.

When desired, the center spindle may also be used in connection with either one or both of the auxiliary heads permitting the machining of three cavities simultaneously.



This set-up was accomplished in 28 minutes and illustrates the speed with which the **HACK** Multi-Versal adapts itself to unusual applications. Two turn tables make possible angular work on two pieces simultaneously. Areas 9"x12" may be done three at a time. Areas 18"x12" may be handled two at a time. Singly, an area of 12"x24" can be covered. This same set-up is applicable to multiple duplicating.

The **HACK** Multi-Versal is an outstanding contribution to faster, lower-cost tool and die production—providing machine equipment for an entire tool and die shop within a space four feet square—performing 26 different cutting operations with ease and dispatch.

A HACK Multi-Versal will soon pay for itself through savings which it makes possible. Send for all the facts TODAY.

HACK MACHINE CO.

**440 No. OAKLEY BLVD.
CHICAGO
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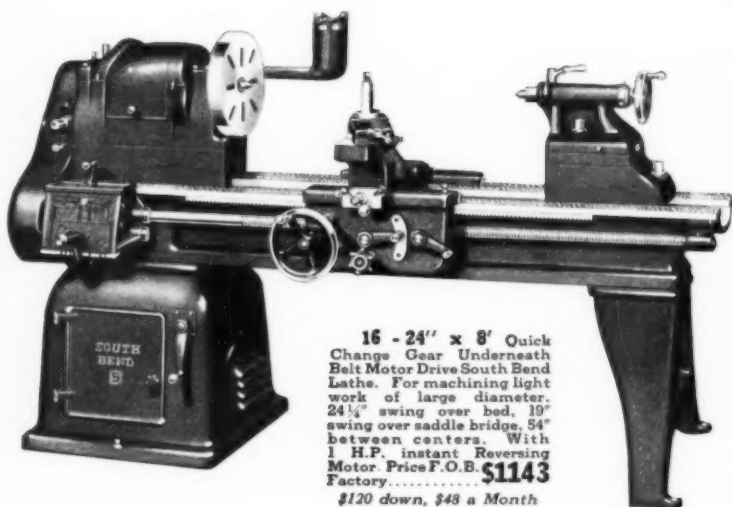
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Mid-West



16 - 24" x 8" Quick Change Gear Underneath Belt Motor Drive South Bend Lathes. For machining light work of large diameter. 24 1/4" swing over bed, 19" swing over saddle bridge, 54" between centers. With 1 H.P. instant Reversing Motor. Price F.O.B. **\$1143**

Factory.....
\$120 down, \$48 a Month

South Bend Lathes

"A Modern Lathe at a Modern Price"

Immediate Delivery can be made of popular sizes of South Bend Lathes from factory and dealer stock.

Dealers in all principal cities display South Bend Lathes. For demonstration write for name of nearest dealer.

Time Payment Plan 10% down, balance in monthly installments. Write for General Catalog No. 98.

Prices of Popular Sizes

Size and Type of Lathe	Dist. Between Centers	Shipping Wgt. Lbs.	Price C'ter-shaft Drive	Price Ped'tal Motor Drive	Price Und'th Motor Drive
9"x3" Workshop Lathe	17"	370	\$85	\$142	\$156
9"x3" Junior Lathe	16 5/8"	416	230	314	351
9"x3" Std. Chg. Gear	16 5/8"	491	287	371	408
9"x4" Quick Chg. Gear	27 3/8"	541	352	436	473
9"x4" Q.C.G. 1" Collet	27 3/8"	885	452	559	590
11"x4" Std. Chg. Gear	24"	965	383	478	541
11"x5" Quick Chg. Gear	36"	1035	457	552	615
13"x4" Std. Chg. Gear	16"	1460	448	572	653
13"x6" Quick Chg. Gear	40"	1560	540	684	745
14 1/2"x5" Std. Chg. Gear	24 1/2"	1995	544	671	779
14 1/2"x7" Qk. Chg. Gear	48 1/2"	2145	654	761	889
16"x8" Quick Chg. Gear	58"	2460	768	907	1013

SOUTH BEND LATHE WORKS

877 East Madison St. South Bend, Ind., U. S. A.

The Editor's Page

An Unhappy Omission . . .

Under the spreading chestnut tree,
the village blacksmith lies;

He tried to shoe an army mule, but
forgot to shoe the flies.

(National Safety Council Bulletin)

Persistence . . .

A most important ingredient of successful selling is persistence. If orders are few and far between, a salesman can get to feel mighty sorry for himself . . . but sales will slump if he admits it. The unflinching determination to follow every possible sales lead . . . to carry on in spite of repeated discouragements is a trait which distinguishes man from many of the lower orders of life.

In training the midjet performers for a flea circus, the tiny pests are imprisoned under glass bowls. Now a flea is about the "jumpingest" thing in all creation. In proportion to his size, he can leap higher and farther than any other creature. But his jumping is subject to mental reservations.

Confined under glass he soon finds that each leap means a bruised head. It doesn't take him long to conclude that a headache is too high a price for a leap. He sells himself so thoroughly on the idea, that long after the bowls are discarded, he cannot be coaxed to jump. He settles down patiently to the routine tasks of juggling tiny dumb bells and toting little carts and wagons about the midjet arena. A single leap would liberate him but he *knows* it is useless to jump—but that is flea-power reasoning.

So if you don't sell on your first call . . . or your forty-first, don't decide that orders are not to be had. Don't concede defeat. Even when the going is hardest, somebody, somewhere can be sold. The first requisite to the familiar plot of *salesman meets order*, is for the salesman to persist in his search. Few indeed, are the orders that pursue a salesman.

A Profitable Investment . . .

"It is a common-place fact to every machine tool manufacturer who has had the opportunity of studying the earnings that can be made by modern machine tools, that such earnings greatly exceed the return that can possibly be secured by the investment of funds in any other way. It is by no means unusual for a machine tool to pay for itself in two years, or even less, and I defy you to find any other investment that will make a return of 50% a year."

The quotation is from an address by Wendell E. Whipp, President of the National Machine Tool Builders' Ass'n at the recent Westinghouse Electrification Forum.

Mr. Whipp further stressed that the national policy of increasing wage rates and shortening hours of employment places upon industrial management, the necessity of compensating for these increased costs by increasing the efficiency of manufacturing organization. Better handling of materials, better methods, better cost control and greater production per operator employed, he believes is the solution to this difficult problem.

Further, he observes that even a partial survey of manufacturing facilities in America's great metal-working industry would reveal that obsolescence has been gaining on us during the past 10 years. When we think of American industry, he says, we are likely to think of the large and outstanding companies with which we are familiar. However, it does not necessarily follow that these efficient units are typical of American industry. Mr. Whipp quoted a recent survey indicating that half of the machine tools in use in American industry today are obsolete and should be replaced.



Certified Steels Help Lower Labor Costs

Labor costs, rapidly becoming today's No. 1 consideration, are in a measure dependent on materials. On most jobs where steel is used, shop costs are the largest and most variable single factor. While the cost of steel itself is relatively small, the quality plays a very important part in the control of these shop labor costs. If it is hard to fabricate—does not work uniformly—has hard spots to dull or break tools—or in the case of alloys, does not respond properly to heat treatment—then shop labor hours pile up and the job ticket shows red.

To meet this growing need for more

uniform, better fabricating steels, Ryerson developed and built up stocks of CERTIFIED STEELS—steels that represent the highest quality in each class and type of material. Users are reporting savings in time, reduction in spoilage and lower labor costs.

Perhaps Ryerson Certified Steels can help you reduce costs. Why not try them on your next job?

Joseph T. Ryerson & Son, Plants at: Chicago, Milwaukee, St. Louis, Cincinnati, Detroit, Cleveland, Buffalo, Boston, Philadelphia, Jersey City.

RYERSON STEEL-SERVICE

THE RISE of the Tool and Die Job Shop

by A. W. Bernsohn

THE Industries sniffed:—"Tool and die job shops! Why they're just back alley businesses, one man affairs. Important? Nonsense."

But that was about ten years ago.

In those ten years the tool and die jobbing field has expanded at least 100 per cent, reaching maturity and full standing as an industry of major importance.

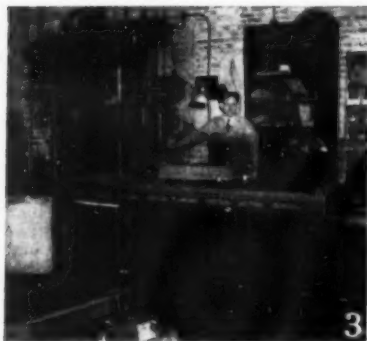
How did this abrupt climb in the business happen? Its sources were varied. In the depth of the depression, some enterprising manufacturers managed to amass sufficient capital to open new businesses. But capital was scarce. Every cent had to be used to bring in more funds. Assembly, advertising and distribution all drew heavily on the assets, but that was active money that soon returned its share

of the profit. The limited amount that could be frozen during this period made it imperative that the new factories forego investments in tool and die departments. This drove a large part of the business to the job shops.

A second source of expansion came from manufacturers whose efficiency experts discovered that their tool and die divisions were in operation only a couple of months a year. The factories therefore were having to shoulder the expense of upkeep, tied-up funds and unused room for the greater part of the year in return for a few weeks' tool and die service.

This, in turn, has had a most heartening effect on the calibre of personnel available for the job shops. A die-maker with ability is a highly skilled expert whose services and experience

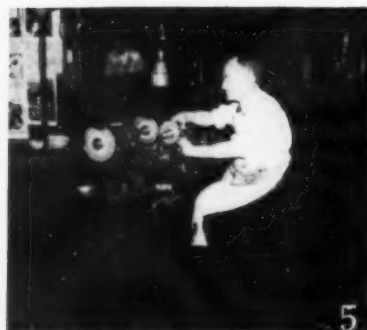




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are hard to duplicate. These experts naturally prefer the steady work of the job shops to the spotted working periods offered by manufacturers whose tool and die departments are in operation only during certain seasons. Job shops manage to maintain fairly steady operation by balancing one industry's dead season against another's. Radios are constructed during part of the year. Automobiles during another part. Electrical goods and household accessories during a third. By keeping the nature of their clients as varied as possible, job shops can offer steady employment to the cream of the workmen and also constantly receive returns on their investments in equipment. This keeps prices in line with manufacturers' exacting requirements.

Variety of operations has another job asset dovetailed into it. By working for many companies having different types of problems, the tool and die job shop manages to maintain engineering, designing and trouble-shooting staffs free from ruts and prepared to tackle all sorts of unusual problems. Variety adds freshness to their outlook on problems and the results show in the original tools used to lick new-found difficulties. Through the constant operation of their specialized end of manufacturing, the job shops can keep well supplied with the newest and most effective of working equipment, cost being minimized by the steady flow of returns from machinery.

A third source of income is from the large percentage of manufacturers who maintain fairly complete tool-making

The Illustrations

Fig. 1—Swiss Jig Borer. Fig. 2—Pratt & Whitney Vertical Shaper. Fig. 3—8" Cleveland Openside Planer. Fig. 4—Swift Spot Welder. Fig. 5—Brown & Sharpe Tool Grinder. Fig. 6—Monarch Lathe. Fig. 7—American Radial Drill. Fig. 8—Cincinnati Shaper. Fig. 9—Progressive Die in Press. Fig. 10—Toledo Double Acting Press.

ing sections in their factories. During peak seasons there is frequently such a heavy load thrust on the tool departments that much of it overflows into job shops throughout the country. These factories also frequently call on the staffs of job shops for assistance in preparing some of their most difficult, complicated and expensive dies.

Thus, thanks to newly arisen factories, those that have production rushes which their tool rooms cannot fully accommodate and to factories using the job diemakers rather than maintaining complete sets of equipment for use only a few weeks out of the year, the tool and die shops have expanded to considerable size within a short period of time.

Many of the newer industries which began precariously and managed to reach success, have continued to grow through the assistance of job shops. These industries, which include many radio and pin game manufacturers as well as some 50 other recently developed fields, are devoting the efforts of production men and company executives to expansion of markets, stimulation of assembly speed and quality and creation of public favor. Manufacture of many parts is delegated to the tool and die job shops and the punch press operating shops.

The latter field, by the way, has shown a growth that makes a striking parallel to the tool and die job shops. Metal stamping manufacturers are springing up all over the country and most of the old-line houses have shown remarkable growth during the past decade.

One of the outstanding examples of the growing new industry is the Quality Hardware and Machine Corp., 5849 North Ravenswood Ave., Chicago, which is headed by President H. A. Laystrom. Mr. Laystrom and associates have built their organization from one with a \$1,500 a week payroll 10 years ago to one with a present weekly payroll that often runs as high as \$14,000.

By hard-driving, straightforward dealing with their rapidly growing list



of customers, the Company has become one of the largest organizations of its sort in the Middle-West. The Quality Company's machinery alone inventories at around a half million dollars.

A variety of customers has been largely the cause of this growth. Some of the most important names in industry have parts or dies made by Quality. Of course, these names must be kept confidential, as well as the types of work done for the various manufacturers by the job shop, since the manufacturers have frequently developed the processes and techniques used, information which they alone may divulge to the public. Also many factories that the public assumes make their own parts, have these parts made in various job shops.

Some idea of the versatility required of a plant such as Quality's may be derived from a cross-section of the work turned out:—washing machine parts, auto radio cabinets, mail addressing equipment dies, pin game mechanisms, automobile bumper holders and hood-lift guards, dies for cutting and forming metal toys, clock hands, piston ring replacers, electric control boxes, precisely indexed armatures, tractor parts, toy spoons, switchboard parts, auto panels, sundry vacuum cleaner parts and pressure cooker gauge dies. This is only a partial list.

There's no danger of this organization making the well-known mistake about some eggs and a basket; and its business plans and provisions cover both continuance and seasonal steadiness.

Personnel is a second type of insurance that the company considers a sound business-securing and holding policy. The factory that hires and trains workers who will render service only a few months out of the year must necessarily suffer some inefficiency while the worker receives his initial training. This company believes that it takes at least a month before a worker is sufficiently skilled and trained to be worth a reasonably high salary. No losses of this sort are experienced by the Quality organiza-

tion. Most of its diemakers have had at least five to ten years' employment with Quality. The turnover of employees is far less in the specialized tool and die shop than in the more variegated manufacturing plant.

The third assurance that the company will continue to grow and maintain heavy, high-calibre production is a sturdy battery of high class equipment.

Let's follow a hypothetical example of die manufacture.

We'll assume it is to be chassis for a radio with many openings of various sizes for wiring, plastic parts and attachments. The metal part is to be of $\frac{1}{16}$ " thickness and formed into shape after the holes have been stamped.

We must remember that not all dies are of the same quality or durability. No, the manufacturer is not playing favorites among his customers. He's just saving some of them money. If the die is to cut only 5,000 parts, it need not be, as long-lasting or as expensive as one that is to stamp out a million parts. If a simple die will do the work, there's no need for a compound die. An inexpensive die that is to be used for only a few pieces doesn't need thickness for long life. If the accuracy doesn't have to be within the tiniest part of an inch, the manufacturer would be going to unnecessary expense in paying for one made to the most minute measurements.

The first move in making any die is a complete layout. From this layout it is determined how to proceed.

In the case of the radio chassis, which in most cases requires a large die, it is a good practice to divide or section it out so that a number of men can work at the same time. This will expedite delivery.

Also, due to its size a single piece would not be practical.

With the layout completed, the pieces of tool steel are then cut to their respective sizes and shaped to fit as per layout. They are then drilled and tapped so that they may be fastened on the die shoe where all holes are jig bored to dimensions shown on the layout.

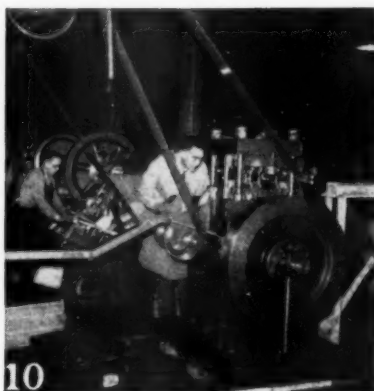


With the layout completed, the piercing and blanking punches are being made ready while die blocks are hardened and reassembled on shoe. The punch plates which have also been jig bored are ready to receive piercing punches. These punch plates are located on punch holder with piercing punches entered in die to insure alignment between punch and die. This is a very important detail because when punch and die are perfectly lined up, the parts will be turned out free from burrs.

The stripper is then laid out from the die and assembled with the proper screws. Next, slug holes are provided in the shoe and due to the great number of slugs coming through the die over a wide area, parallels are added under die shoe to provide a means of ejecting slugs.

One large Company whose products are widely used, had trouble some time ago with "bootleggers" of substitute attachments for their products. These "bootleggers" were stamping out certain parts and selling them at prices the manufacturer could not meet.

In desperation, the manufacturer ordered from Quality an intricate die, which cost thousands of dollars, but which eliminated many of the operations in the manufacture of the parts.



About five operations were combined into one and speed of manufacture was stepped up while cost was brought down to a fraction of the former price. Thus the "bootleggers" were beaten at their own game and the manufacturer was able to supply his customers with parts that he knew would give the customers the greatest satisfaction from his machines.

One of the Company's specialties is progressive dies. An interesting one recently made in the plant is for the manufacture of metal cartridge holders. It was found that old-style web belts stretch too much, thus causing irregularity in spacing of the cartridges and often jamming the feed. Metal clips have eliminated this. The die works in a series of eight operations, which cut, stamp, curl and pattern the cartridge holders and turn them out perfectly made at high speed. Twin pins, spaced uniformly, shift the metal along the die each time a cut is made. Thus, each part undergoes eight operations and every time the die and metal strip come in contact, after the first seven, a part is completed. The company always builds its progressive and compound dies for automatic feed.

These are just two of the many die jobs. Picture making others for, say,

a radio pilot light socket, a heating element for an electric stove, a burner plate, a vending machine part. Ponder on the construction of dies for these and almost any other type of metal part of which the imagination is capable. Add to that the work of assembling thousands of parts a day and stamping and finishing units for these parts in the same plant. It gives you a reasonably accurate idea of how the Company manages to keep a uniform personnel of 200 busy in two shifts at almost all times, and frequently requires a third shift.

These stamping and assembly jobs account for much of the activity in the Quality plant. Here's a stove part of 1/8" alloy steel. It's to be subjected to extreme temperature changes. Quality stamps and draws this part on a Toledo double acting press in a single operation. The shape is permanent, free of spring. Measurements are precise. Sides of the part are cupped uniformly.

A Minster 150 ton stamping machine cuts out the heavier parts.

Cabinets, cases and many other parts are assembled in the plant by spot welding. There is an extensive battery of spot welding equipment in use in the assembly rooms. Speed in operation was a major factor that influenced the company to add this equipment to the shop. To this end some machines that weld four to eight spots at a time are used.

Many of the heavier spot welding jobs are done on an American Electric Fusion welder. This is used to space spot welds properly to stand wearing strain or sustain weights. It welds a fairly large spot in a quick single operation and because of its easily accessible electrodes can be used in the assembly of many entire parts requiring intricate spot work.

But the primary work of Quality is the manufacture of dies and tools. For this work a battery of milling equipment, lathes, shapers, drills, planers and grinders has been lined up. Beside almost every machine that is used for cutting metal is an air hose ready to clean away metal particles.

One of the larger machines in the tool room is the eight-foot Cleveland open side planer, used in machining the larger die blocks and mounts, when the surfaces to be machined run the long way of the piece. It is also used when "string planing" is done, as when many smaller pieces are put in a row, and run through simultaneously. At other times, work of this sort is done on the milling machine. The planer, thanks to its long bed, supports the work the entire length over which it is being machined. Quality has its planer set level and square on a sturdy foundation that furthers good work.

The machine automatically keeps chips and dirt off the ways as the table travels along them and also has an automatic oiling attachment which filters the oil before it returns to the bearings. Its operation is simple, but the operator at Quality is required to know his metal as well as his machine. The changing shape of metal that has been under tension after the surface has been removed, for example is not a problem to the operator at Quality. He usually rough planes one side of the metal, then turns it over and rough planes the other side often when there is no need of finish on the second side. This relieves the strain in the tensioned metal that would throw it out of line after it was finished.

Some of the tools used on the planer are interchangeable with shapers and the Pratt & Whitney vertical shaper.

Shapers in the plant are made by two companies, Gould & Eberhart and Cincinnati. These are heavy, rigid machines that despite their bulk and sturdiness can turn out the finest work required. The tools are moved across the work by a stiff ram which allows very little spring in action. The machines are heavy, the 16 inch Cincinnati weighing 4,000 pounds without its motors. The ram that carries the tool is provided with eight speed changes, the speed being based on the length of the cut and the quality of metal being worked. Strokes vary on the 16-inch machine from 11 per minute to 138.

The shapers have universal tables

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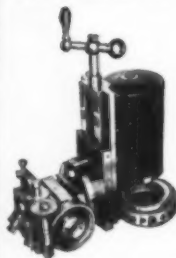
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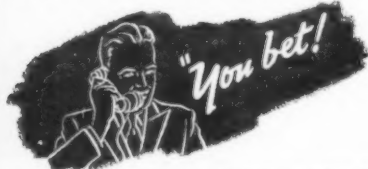
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and can be swiveled on center supports by worms under the front ends. The top of the table can be rocked on the curved base. The table can be turned 90 degrees.

The versatile shapers are sometimes used to plane inside or through a piece of metal, for example. Also for knurling or marking round work.

A Pratt & Whitney vertical shaper does the slotting jobs. This is particularly valuable because of its rotary, longitudinal and cross feeds. Mr. Laystrom finds this machine useful because it is readily set at any angle to give clearance on dies and similar work. Its most frequent use in the shop is in work requiring flat surfaces at right angles to the main body, this work being difficult on either the planer or shaper.

Kearney and Trecker milling machines are used. The dividing head attachment contributes to gear work, fluting, reamer, cutter and drill manufacture and laying off of plates. Cutting speeds and feeds at which the shop operates its mills vary with the cutter diameter and the nature of block being machined. The company uses the Kearney & Trecker chart in checking these factors each time new jobs are being started. Speeds are always started slowly and then stepped up and feed is handled likewise.

Among the points stressed in connection with mill operation is the particular care of machinery. Lubrication; cleanliness; locking of knee, saddle and table gib; sharp, true-running cutters; guarding against backlash, unsated arbors in spindles, wrong-sized collars and loosely locked cutters; and properly harnessed cutters and anchored work all are strong operation points.

This type of milling machine is favored because of the substantial rigid support for the table and the work afforded by the pedestal. The multiple spindle helps speed up milling operations. Then too, the machines have several auxiliary head sets and special angles to handle unusual work. These machines, Mr. Laystrom says, are an improvement in his work over the long-

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bed miller of the planer type. They can be loaded and unloaded more rapidly and any way that idle time of expensive machines can be lowered is a step in the right direction.

The factory frequently experiments with new types of alloys in milling-machine operations. In these experiments, great care is taken to select approximately the correct cutter for the material. The cutters are treated like precision instruments because of their expense and thus the life of the blades is prolonged. Grinding machines are always kept in good condition because of their importance as an extra check. Operators are made as familiar as possible with the nature of the metals being machined and the uses to which they are to be put. Speeds and feeds are started very slowly and increased bit by bit in order to find the highest production point conducive to efficient operation.

Best of care is taken of the milling cutters by each operator who handles a milling machine. The formed milling

cutters are watched at all times against flattening on the top of the teeth. As soon as this flattening is discovered, the face of the teeth is ground until a new sharp edge has been formed. The cutter is always resharpened at the same rake and helical angles to keep teeth wearing down smoothly and to maintain the contour in line with the plane of the cutter axis. The angles are checked with a gauge whenever the cutters are sharpened.

A Browne & Sharpe tool grinder is used along with a Universal grinder for the various sharpening operations done in the Quality plant. The machines are always kept in good repair, with the spindle free-running and the bearings devoid of chatter. No end play is permitted on the tool grinding equipment and the table ways are kept straight and true. Most of the grinding wheels are of Norton manufacture. The high-speed steel cutters are ground dry to prevent water cooling the cutting edge too rapidly and causing

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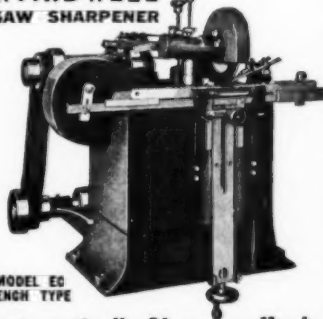
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cracking. Cutters are mounted accurately and rigidly in sharpening machines, the arbor used being as accurate as that of the milling machines. Sufficient clearance is maintained behind cutting edges to prevent rubbing. For low carbon steels, this angle is around six degrees and for high carbon or alloy steels, around four degrees.

Abrasive Grinding machines are used for most of the tool and die manufacturing work. The Model 3 is popular in the plant. There are eight of

these machines in use by Quality, and here again Norton wheels are used.

Lathes used in the die manufacture are of Pratt & Whitney and Monarch manufacture. An assortment of cutting lubricants is kept on hand at all times for the various types of metal being worked on these machines. When Monel metal is threaded, a compound of lead and oil is used as a lubricant. Mineral lard oil is used on Bessemer and basic steel and a mixture of kerosene and cutting oil is used on aluminum.



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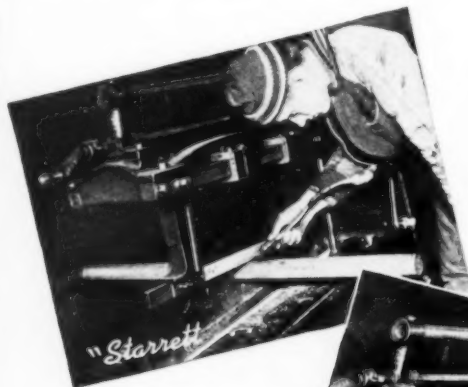
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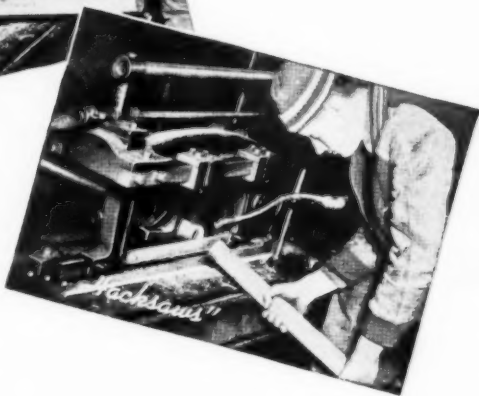
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HEAT TREATMENT

For Metal Stamping Dies

By Burns George,

Metallurgist Vanadium-Alloys Steel Co., Latrobe, Pa.

ALL preparation rightfully requires thoughtful work on the part of the heat treater as well as the tool-room foreman and the shop management. Since the life of such dies is so dependent on the heat treatment it is sound management to provide the hardener with first class equipment. This does not necessarily mean the most expensive equipment but rather that which is most adaptable. While suitable furnaces are now generally available, accessories are often neglected. Even correctly designed tongs and other handling devices are commonly overlooked.

Size Tolerance

Size tolerance and freedom from warpage are important in heat treating such dies. Unless previous experience has definitely proven it unnecessary, therefore, it is advisable to give metal stamping dies a stress relieving treatment prior to hardening in order to eliminate machining stresses. This may call for consultations between the tool room foreman and the hardener. A well tried practice involves rough machining, stress relief and then finish machining. Where the dies are not of intricate design or the size tolerance is reasonably wide it is possible to apply the stress relieving treatment after finish machining and prior to hardening. In this case the stress relieving treatment may be eliminated if a very slow heating rate is used in heating for hardening. Where dies are made by hubbing or by severe hand "broaching" processes a stress relief treatment is always advisable.

It is not necessary to apply a full anneal or normalizing treatment for the removal of cold working stresses set up in machining, hubbing, etc. Heating the dies slowly in the open furnace to just under the critical range will correct grain distortion and relieve stresses from hubbing and a somewhat lower temperature (1200 to 1300 deg. F.) may be used for machining strains if a minimum of scale is desired. The dies may be cooled with the furnace or in still air after being held at temperature a sufficient time to insure complete uniformity.

Blocking Off

The next step in preparation of dies for hardening involves packing the holes or blocking off sections where full hardness is not desired. It is rarely necessary to pack holes or thin sections of manganese oil hardening or high carbon high chromium steels. These steels should not be susceptible to cracking through thin sections if they have been treated for hardening uniformly. There is no danger in high speed steels either but tapped holes should be packed to prevent excessive scaling of the threads if open fire treatment is used. Packing the holes in dies of carbon or carbon vanadium steel is necessary unless the holes represent a working part of the die in which case the water or brine used for quenching should be forced through the hole if at all possible.

Many die failures occur in carbon and carbon vanadium steels due to cracking through thin sections or spalling of corners. Often this causes the use of some other type of steel

when these grades might otherwise prove most advantageous. Such failures can be eliminated by properly packing the holes or corners.

A very satisfactory mixture for holes is made from about equal portions of shredded asbestos and fire clay. This should be mixed with water to a consistency that can be molded in the fingers yet remain stiff. After filling in the holes of the dies, the mixture can be held in place throughout the quench if two or three nails or tacks are inserted. Length of the nails or tacks should be governed by the depth of the holes. If the holes are close to the edges of the die so that hardness depth will penetrate through, or at corners a different packing method should be followed. In this case soft wire of about No. 1

to 3 gauge should be looped through the hole and around the edge or both sides of a corner a few times. The hole is then filled with the packing mixture and a small pad of the mixture also pressed tightly around the wire on the outside. This will prevent hardening through the thin section and eliminate cracks and spalling. Packing this mixture around soft wire can also be utilized for the protection of sharp corners where fillets cannot be provided and where full hardness is not essential. In fact, the asbestos-clay mixture can be held on any plain surface during quenching if it is dried slowly before the dies are placed in the furnace for heating. For applying to a plain surface the wire should be bent with hair-pin turns to give maximum gripping power, then

HEAT TREATMENTS FOR METAL STAMPING DIES

Type	Annealing Temperature	Quenching Temperature	Quenching Medium	Tempering Temperature
Carbon Tool Steels				
Carbon	1400-1450 deg. F.	1400-1475 deg. F.	Water or brine	400-550 deg. F.
Carbon with Cr.	1400-1450 deg. F.	1400-1475 deg. F.	Water or Brine	425-575 deg. F.
Carbon with Va.	1400-1450 deg. F.	1425-1500 deg. F.	Water or brine	400-550 deg. F.
Carbon with .50 per cent Va.	1425-1450 deg. F.	1450-1600 deg. F.	Water or brine	400-550 deg. F.

Note: Wide hardening range useful for varying depth of hardness without grain growth.

Manganese Oil Hardening Steels				
A	1425-1450 deg. F.	1425-1475 deg. F.	Oil	325-500 deg. F.
B	1425-1450 deg. F.	1425-1475 deg. F.	Oil	325-500 deg. F.
C	1425-1450 deg. F.	1425-1475 deg. F.	Oil	325-500 deg. F.
D	1425-1450 deg. F.	1425-1475 deg. F.	Oil	325-500 deg. F.

High Carbon, Tungsten, Chromium Steels				
A	1450-1475 deg. F.	1450-1525 deg. F.	Water	325-500 deg. F.
B	1450-1500 deg. F.	1600-1650 deg. F.	Oil	400-600 deg. F.
C	1450-1500 deg. F.	1575-1625 deg. F.	Oil	400-600 deg. F.

Chrome, Nickel, Molybdenum Steels				
	1425-1500 deg. F.	1425-1525 deg. F.	Oil	400-550 deg. F.
Tungsten Alloy Chisel Steels				
A	1475-1500 deg. F.	1600-1650 deg. F.	Oil	600-1050 deg. F.

For high surface hardness pack in charcoal or carburizing compound.

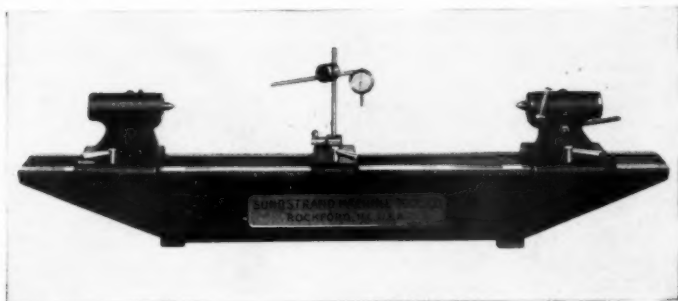
Type	Annealing Temperature	Quenching Temperature	Quenching Medium	Tempering Temperature
Oil Hardening High Carbon High Chromium Steels				
Should be pack hardened to prevent decarburization.				
A	1600-1650 deg. F.	1750-1800 deg. F.	Oil	400-600 deg. F.
B	1600-1650 deg. F.	1750-1800 deg. F.	Oil	400-600 deg. F.
D	1600-1650 deg. F.	1750-1800 deg. F.	Oil	400-600 deg. F.
H	1600-1650 deg. F.	1750-1800 deg. F.	Oil	400-600 deg. F.

Air Hardening High Carbon High Chromium Steels				
Should be pack hardened to prevent decarburization.				
C	1600-1650 deg. F.	1850-1900 deg. F.	Still Air	400-600 deg. F.
E	1600-1650 deg. F.	1850-1900 deg. F.	Still Air	400-600 deg. F.
F	1600-1650 deg. F.	1850-1900 deg. F.	Still Air	400-600 deg. F.
G	1600-1650 deg. F.	1850-1900 deg. F.	Still Air	400-600 deg. F.
K	1600-1650 deg. F.	1850-1900 deg. F.	Still Air	400-600 deg. F.

High Speed Steels				
A	1600-1650 deg. F.	2250-2300 deg. F.	Air or Oil	1050-1150 deg. F.*
A		1900-2000 deg. F.	Air or Oil	1050-1150 deg. F.†
B	1600-1650 deg. F.	2280-2330 deg. F.	Air or Oil	1050-1200 deg. F.*
R		1900-2000 deg. F.	Air or Oil	1050-1150 deg. F.†

*Open fire treatment. †Pack hardening carburizing treatment.

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fastened to the die and the asbestos mixture packed tightly against it. Fig. 1 shows one manner of using this idea.

Handling of Heated Die

Consideration must be given to the method used in handling the die from the furnace through the quench. If tongs are used they should be of proper design to permit handling without scoring the impressions of the die. Many dies cannot be handled with tongs without danger of warpage or distortion caused by their own weight. Even dies having very heavy sections can be spoiled in this way if it is considered that at times a thousandth or two of excessive movement may render them useless. Small dies may be supported, on trays and handled from the furnace by lifting the tray with tongs. Large dies may be moved by supporting the weight uniformly on bars.

A knowledge of the general principles of heat treatment is essential for every hardener. (The reader is referred to pages 676 to 694 of the Metals Handbook, American Society for Metals, for a concise treatment of this matter.)

Slow heating is advantageous for almost all metal stamping dies. This not only helps to avoid warpage and movement but also increases the strength of the die.

Prevention of Soft Spots

Carbon and carbon vanadium steels, particularly of the shallow-hardening type are susceptible to soft spots with the tendency slightly more pronounced in the vanadium bearing grades. The avoidance of soft spots is almost entirely up to the heat treater. Proper atmospheric control during heating and correct quenching methods will eliminate this difficulty. A slightly oxidizing atmosphere is advisable. The steels should be thoroughly soaked at the quenching temperature and the furnace so operated that a loose paper-like scale forms over the die. The formation of a tight scale is detrimental. It is difficult to obtain "bubble-like" scale in some furnaces but this may be aided by allowing

prolonged soak at a temperature 40 to 50 degrees Fahr. below the quenching temperature. Since carbon vanadium steels are generally more shallow-hardening, a quenching temperature 25 to 50 degrees higher than that used for carbon steels is advisable for the prevention of soft spots. A ten per cent brine solution is recommended for quenching except for very intricate dies where this might prove

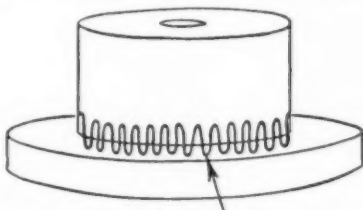


Fig. 1. Method for holding asbestos-clay mixture to plain surface during quenching.

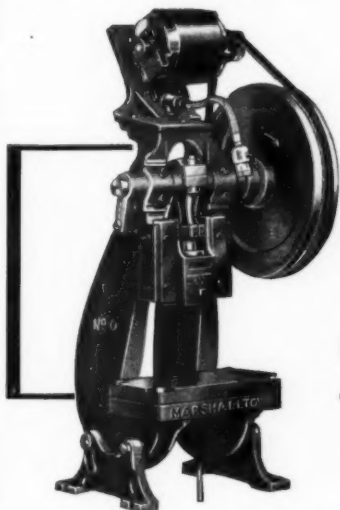
too drastic. In most instances a mechanically agitated bath is better than agitating the dies in a still bath.

Oil Hardening Problems

Most manganese oil hardening steels harden readily enough in oil from very low temperatures. Many die failures are caused by quenching from the high side or above the recommended range due to the operator's fear of obtaining insufficient hardness. These steels seem to be affected by even slight grain growth so that a thorough soak from the lowest possible temperature will provide the greatest safety. The high side of the heating range is usually necessary for very large die only. This method of procedure will also be beneficial in preventing excessive movement. A slightly oxidizing atmosphere is necessary in preventing the .001" to .002" soft skin so often encountered.

When a final hardness of Rockwell C 59 is sufficient there is no advantage in treating dies to an initial hardness of Rockwell C 65 to 66, since greater hardness is always accompanied by greater movement. Movement of dies is also reduced by proper handling during quenching.

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Vigorous agitation is not necessary for obtaining good hardness. Dies should preferably be supported on a wire tray or similar means during quenching rather than in tongs and should be moved in the oil only enough to insure good oil contact.

Another source of difficulty with manganese oil hardening steels comes from heating too rapidly during tempering or drawing. Cracks are readily produced in this way and at time may not be observed until the die has been placed in production. This type of crack is characterized by its irregularity and several may form in different areas of the die. Dies made from this type of steel may be cooled to approximately 100 degrees Fahr. during quenching but should not be placed in a drawing furnace or bath the temperature of which exceeds 250 degrees Fahr. From this temperature or below the specimens should be heated slowly to the desired point.

Low tungsten oil hardening steels are not as susceptible to grain growth as manganese oil hardening types. They have the ability to harden to a very high degree when the sections are light but the initial hardness on quenching drops as the size increases. Precautions as to quenching and tempering procedure are applicable to all low alloy steels. Packing of holes is more essential in the low tungsten oil hardening type than in the case with other oil hardening grades.

Pack Hardening

Pack hardening treatments are seldom advisable with the carbon and low alloy steels except when carburization is desirable as mentioned for tungsten chisel steels in "Steels for Stamping Dies." The use of charcoal for packing at low temperatures is apt to cause decarburization. Even carburizing compound has little or no activity at temperatures below 1470 degrees Fahr. It is always advisable to pack harden high carbon high chromium steels unless the dies can be ground all over after treating since these steels tend to decarburize when open fire methods are used. Charcoal

possesses carburizing activity at temperatures above 1575 to 1600 degs. F., the amount of activity varying with the increase in temperature. High carbon high chromium dies can be expected to develop considerable carburization, therefore, when packed with this material. This is very often desirable, especially with dies subject to extreme wear and little shock. For dies of intricate design, thin projections and those required to main-

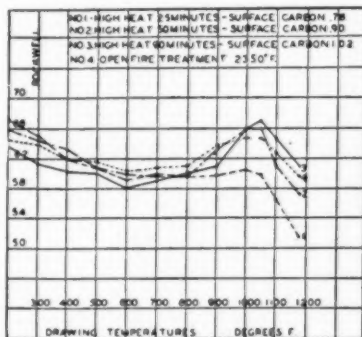


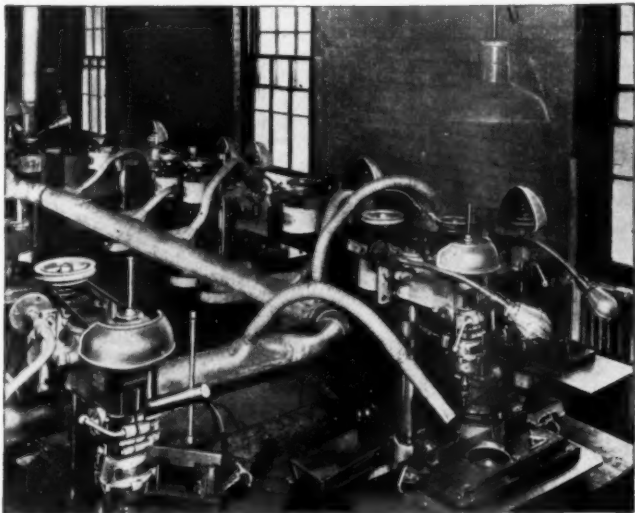
Fig. 2. Graph showing High Speed Steel Pack Hardened in four different time periods.

tain keen cutting edges the carburized surface is very undesirable. Carburization will cause edge crumbling and chipping on such specimens. Spent pitch coke, or pitch coke which has previously been heated to drive off all volatile matter, is best adapted for treating these dies. Spent pitch coke will not carburize at temperatures from 1650 to 2050 degs. F. At temperatures below 1650 degrees Fahr. the material is decarburizing in action and should not be used.

Dies packed with 6 to 8 mesh size spent pitch coke need not be covered to a depth greater than about 1/2 inch since the material does not shrink during the heating and there is no danger of the steel becoming exposed. When packing with charcoal a covering of about 1 inch is advisable.

Metal stamping dies made from high speed steel are often heat treated

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by pack hardening methods, since the treatment offers several advantages. Dies treated in this way are free from scale and "sweat" and provide edges of high wear resistance with tougher core. Warpage and size change are eliminated. Pack hardened high speed steel will give die life equal to that of high carbon high chromium steels, causing the high speed steel to be useful when more difficult machining qualities render the high carbon high chromium impractical. Of course, pack hardened high speed steel should not be used for fine edged tools or die requiring heat resisting qualities.

Charred excelsior or charcoal crushed to 6 to 8 mesh size and free from dust are excellent mediums for packing high speed steel in order to provide carburized surfaces. The die should be packed so that it is surrounded by approximately one inch of the fine charcoal. Using more than this amount of packing compound increases the time of heating at the high temperature and thus increases the amount of carburization, causing danger of pitting of the surface. All dies should be so packed that their weight does not rest on the working faces. The box should, of course, be sealed with fire clay or some similar material.

A wire rod should be inserted through a hole in the box so that it is adjacent to the steel being treated. This rod may be partly withdrawn from time to time during the heating operation to inform the operator when the steel has reached the desired temperature. The steel should be quenched

immediately upon reaching the desired temperature since prolonged heating may produce pitting of the surfaces.

After packing with the above provisions preheating is normally accomplished at 1550 degs. F. Time in preheating will vary with the size and weight of the unit as well as the size of the furnace in which heating is performed, although a heating time of 1 to 1½ hours for each inch of thickness will usually insure uniformity.

A high heat of 1900 deg. F. to 2000 degs. F. is most satisfactory for final heating. The lower temperature is recommended for very small parts where heating will be rapid while the higher temperature is used for larger sections where heat absorption is slow. It should be emphasized that parts should be removed and quenched immediately upon coming to heat.

Quenching

The quenching medium may be either oil or light air blast depending upon results desired. Light air blast will produce a thin scale which is usually easily removed while oil will prevent scale formation. Danger of warping is greater in oil quenching, however, while this trouble is eliminated in the air blast.

If maximum hardness is desired after quenching, the drawing may be done in the usual way 1000 to 1050 degs. F. The accompanying hardness curve indicates the effect of drawing temperatures and will be found a useful guide in obtaining the final hardness desired. The eleven specimens for each curve were heat treated together and the length of time that each group was held in the high heat is mentioned on the curve. In this connection the specimens for curve number 3, held in high heat 90 minutes, were all slightly pitted so that it may be assumed that the soaking time for this group was too long.

In table I will be found a list of general treating data for use with the steels mentioned in the associated paper.



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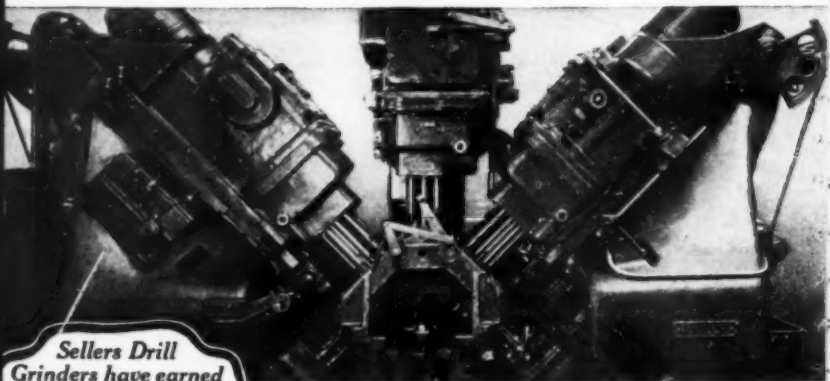
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BY "UNIT" drill grinding, we mean grinding a complete set of multiple spindle drills to an equal length so that when drills become dull, a reground set can replace the worn one without necessitating individual spindle adjustment. In this way, valuable time ordinarily lost in the grinding and adjusting of individual drills is saved and drilling costs are greatly lowered.

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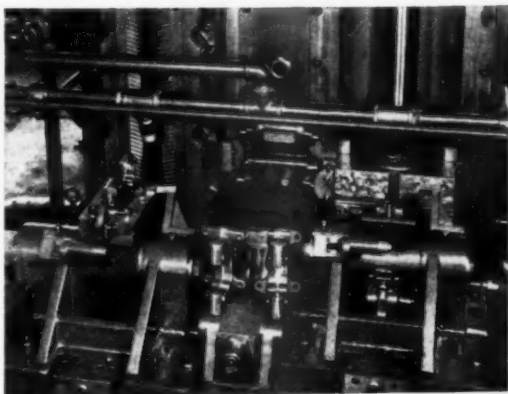
STEERING knuckles for a leading low-priced car are now being produced virtually complete (with the exception of machining the shank, drilling and reaming king pin holes and brake drum flange holes) in three broaching operations. Using two broaching machines for each operation, production is at the rate of roughly 3 knuckles per minute, with tolerances held to as little as .003 in. for spacing and squareness of faces.

Major sequence of operations is as follows:

1. Drill holes in brake drum flange
2. Turn shank
3. Rough and finish broach one side of 4 ears on brake drum flange
4. Rough and finish broach outside and rough broach inside faces of 2 king-pin bosses
6. Finish broach inside faces of king-pin bosses square with king-pin holes

In the first broaching operation, the steering knuckle is located from the shank and dowel pins for the brake drum holes in a Colonial 10 ton, 48 in. stroke, Dual Ram hydraulic broaching machine with receding tables.

Operation of the fixtures is quite interesting. On the completion of a broaching stroke, the table travels back, causing the work holding part of the fixture to swing back in a 90 degree arc. The part is mechanically ejected for easy removal and reloading. An automatic spring holding device keeps the part in position while the trunnion



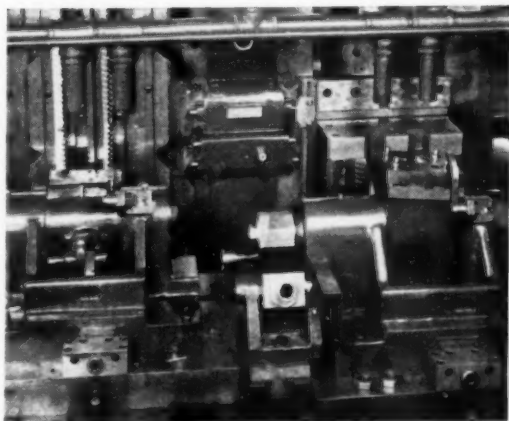
swings back into broaching position just before the ram starts down again. The work is supported with an automatic wedge to take strain off the locating pins.

The fixtures are also designed to compensate for broach wear.

The two sets of broaches in the two rams are identical, and each roughs and finishes in one stroke. Cutting speed is 30 ft., per minute. Production is approximately 340 pieces per hour for each of the two machines used. Operation is continuous, the operator merely loading and unloading each ram in turn.

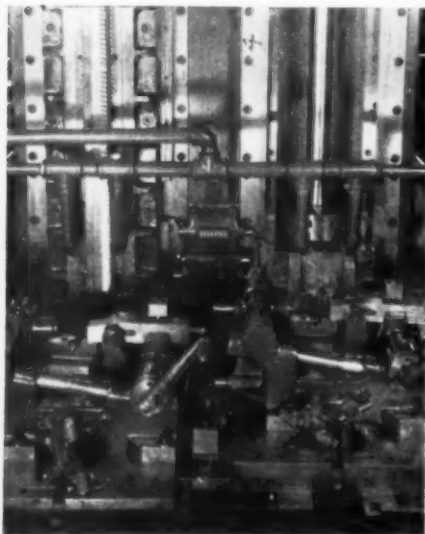
Broaching of the faces of the two king pin bosses is carried out on a 25 ton Colonial dual ram hydraulic broach, with 60 inch stroke, two machines again being used. As shown in Fig. 2, fixtures are similar in general design and function in the same manner as those in the first broaching operation, including trunnioned fixture

operated by the table movement, etc. Locating is also similar in character. Instead of a wedge, two plungers are provided in this fixture to support the bosses against the force of the cut. These plungers are of the automatic compensating type. They are actuated by the movement of the ram. Part ejection is also automatic, as is the spring clamping during the swing of the fixture. Production is 235 pieces per hour for each of the two machines. Approximately .030 inches of stock is left on the inside faces for finish broaching.



After drilling and reaming of the king-pin hole, the knuckles go to the

final broaching operation—for finishing the inside faces. As shown in Fig. 3, the knuckle is located from the shank in a half-round support, and cross-ways by pins through the king-pin holes with which the faces must be square. These plungers are moved in and out by a crank. Bosses are again supported during broaching by automatic plungers, as previously, but in this case they are actuated from the fixture instead of the ram.



As the locating plungers enter the king-pin bosses, a clamp comes down on top of the knuckle, being mechanically operated from the same crank.

For this operation there is no trunnion, but the fixture is mounted on the receding table to permit continuous operation. Adjustment is provided in a cross-wide direction for set-up compensating purposes. Again two machines are used being Colonial Dual Rams of 6-ton capacity with 36 inch stroke. Production obtained is 340 pieces per hour from each machine.

The Smallest Die Casting

Many tiny, intricate parts have been produced by the die casting process. A contemporary, "Steel" recently published an item along this line which seems to have aroused a competitive spirit. The smallest casting unearthed so far is a slide fastener element, weighing .022 gram or .00077 oz. In other words, it would take 1290 of these to make an ounce, and 20,640 of them

would weigh a pound. The castings in question have been produced in millions by Crown Fastener Division of the Spool Cotton Co.

This is one of many interesting items in the current issue of The Alloy Pot, published by The New Jersey Zinc Co., 160 Front St., New York.

Details are given of the manner in which a Sunbeam Shavemaster marketing problem was licked. An obstacle to electric shaver sales has been

the difficulty of persuading razor addicts to try the new whisker removers. Chicago Flexible Shaft Co., solved this by means of an attractive store counter demonstrator set, mounting a Shavemaster with a convenient mirror and inviting the prospect to give it a trial.

A new governor for speeds and buses has been developed by Leibing Automotive Devices, Inc., and produced by die casting. Unlike others, it is not inserted between carburetor and manifold but forms a part of the carburetor. Another device known as a degasser, shuts off fuel to the motor when decelerating. A diaphragm, vacuum operated, accomplishes this automatically.

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WHAT'S NEW *in the industry*



Minster Announces New Presses

The Minster Machine Co., Minster, Ohio, announce their new line of 50 Series Double Crank Straight Side Presses with improved box type sections for the frame members, present-



ing a pleasing appearance that will do credit to any modern tool setup. The 50-4 $\frac{1}{2}$ -42 Double Crank Straight Side Press is shown, having 74 ton ca-

capacity, with a bed length of 42". The slide ways are exceptionally long and during the working part of the stroke the entire length of the gibs afford a bearing surface. It is explained that this method of construction permits unbalanced load conditions to be set up without tilting the slide. The box type crowns have a section below the center line of the crankshaft as well as above, rigidly supporting the crankshaft.

For the larger presses, slide counterbalance cylinders are mounted in the crown, requiring neither additional ceiling height nor projections outside of the frame members.

The presses are lubricated from a central point with the system confined within the closure of the press. Wiring and control panel for the press control circuit are enclosed.

The base has a deep section and minimum of projection for accessibility with trucks and eliminating foot hazards.

The press is powered either by air or hydraulic combination friction clutch and brake and controlled electrically with push buttons conveniently mounted.

The smaller size presses in the 50 series can be furnished with the Minster Multi-Engage Spline Clutch.

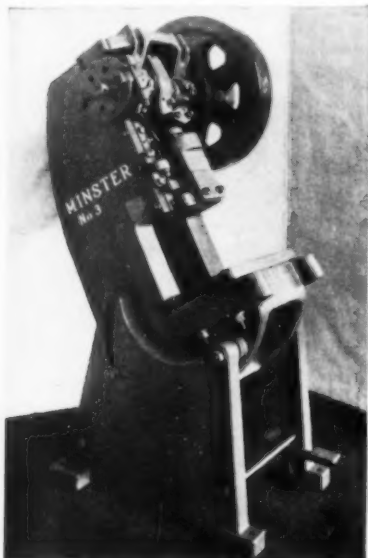
They also offer a new line of open back inclinable presses in nine sizes, ranging in capacity from 12 to 113 tons. The frames are of a high tensile strength, alloyed semi-steel cast construction. The upper part of the frame is of a box type construction with 45° overhanging crankshaft bear-

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ings.

True ring nickel bronze bushings are used for the crankshaft bearing and tapered anti-friction bearings on the drive shaft and clutch wheel.

The slide and gib designs have been changed to incorporate longer ways,



increasing bearing surface, stronger slide and renewable nickel bronze ball and socket bushings in the slide. The brake on the positive clutch presses is designed for long life, constant uniform brake torque and low operating temperature under extreme conditions. The brake shoe is a two-piece assembly, lined with four segments of oil-proof molded lining and finned to aid heat radiation.

The Multi-Engage Spline Clutch, having 10 to 22 points of engagement, depending on the size, is standard equipment on these presses. Sizes No. 7, 8 and 9, in the geared type presses, can also be furnished with the Minster Combination Multiple Disc Fric-

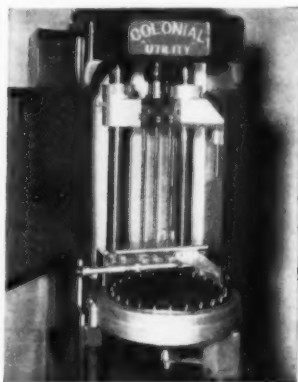
tion Clutch and Brake.

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The formation of fatigue cracks in piston pins is said to have been virtually eliminated by a well-known automobile company. The method was the simple expedient of finish broaching and burnishing the bores of the wrist-pins. The operation, performed on a Colonial Utility broaching machine with hydraulic automatic index table designed for continuous cycle, is exceedingly fast, some 400 pieces per hour being produced on this single machine.

Three pieces are finished each stroke of the ram, the operator merely loading the indexing table, which indexes an amount equal to three pins for each ram stroke. After broaching, the pieces are automatically ejected. The broaching operation eliminated circular tool marks within the bore of the pin, — found to be the cause of occasional failure due to the formation of fatigue cracks starting at the tool marks.

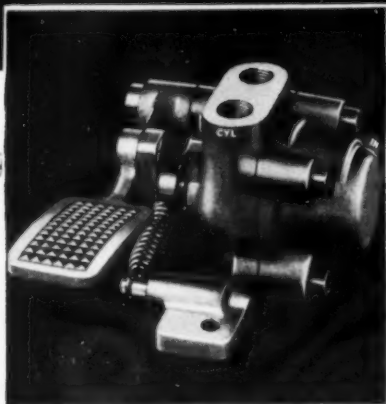


At the top of the broaches are circular burnishing rings to complete the operation in one stroke.

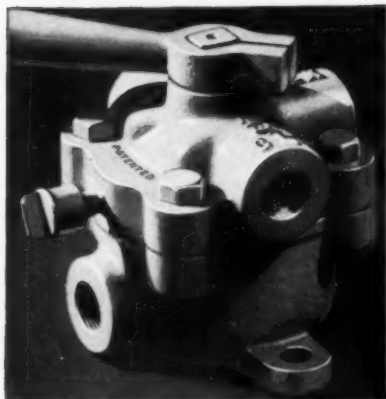
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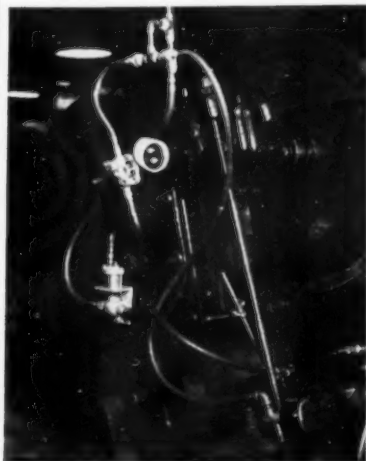
UNIVERSAL COLLET CHUCKS TWO NEW SIZES AND TWO NEW IMPROVEMENTS

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Schrader Pilot Valve

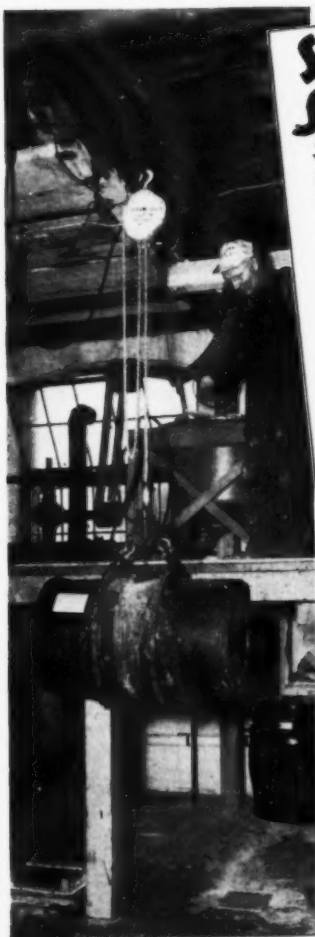
A new product development by Schrader's known as the Pilot Valve is designed to give a delayed or prolonged blast of air for ejecting work from a press, after the ram has stopped its upward motion. It is especially useful on manually fed presses using over-head knockout or compound dies.



The duration of the air blast may be regulated by a simple screw adjustment on the valve. It is easy to service and saves money by conserving air and eliminating the necessity of interchanging machine parts to achieve the results of a timed blast of air. With vent closed, it may be used as an air control valve on any mechanism. For complete catalog data and technical information write to A. Schrader's Son Division of Scovill Manufacturing Company, Inc., 470 Vanderbilt Avenue, Brooklyn, New York, and we'll appreciate mention of The BLUE BOOK.

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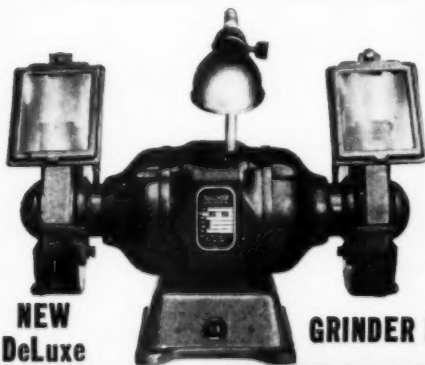
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Facts, up to, ins.....	2x3/2	3x7/8	4x1/4
Rounds and Squares.....	7/16	1/2	1/2
Length of Blades, ins.....	4 1/2	6	8
Net weight, about.....	20 lbs.	30 lbs.	45 lbs.
PRICE.....	\$12.00	\$18.00	\$32.00

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4" Machinists' Vise,.....	\$10.50	\$14.00 net
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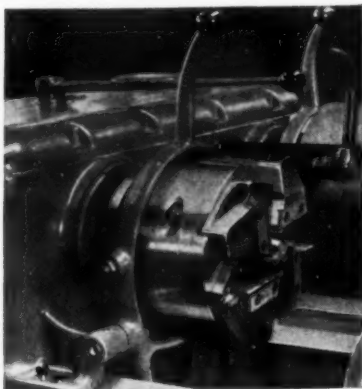


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Wm. S. Yohe Supply Co.
503 Mahoning Road
CANTON, OHIO

Landis Head for Tapered Threads

The Landis Machine Co., Waynesboro, Pa. announce development of a new method for the cutting of tapered threads with Landis pipe and nipple threading heads.



Incorporating a number of changes in the design of the present threading head, outward appearance of the head is unchanged. Operating mechanism within the head has been redesigned so that as the die head advances under cut, the end of the work will contact the reamer and cause the chasers to recede to produce a tapered thread. This receding action does not commence until after the first two or three threads are formed. Thus the term "Semi-Receding." The reamer mechanism is used to establish the total thread length, and since the reamer mechanism is in no way connected to the size adjustment mechanism, it is possible to adjust the die head for size without effecting the thread length.

An application for a patent on this fixture has been filed. For additional information, please address the makers—and we'll appreciate mention of **THE BLUE BOOK**.

A MORE EFFICIENT WAY TO MOTORIZE MACHINE TOOLS

The Turner **UNI-DRIVE**

This unit with four-speed selective sliding gear transmission eliminates overhead countershafts. Compact, quiet, efficient. Ball bearing gears run in oil. Sizes, $\frac{1}{2}$ to 10 H. P. Easy to install. Fully guaranteed. Now used by scores of leading concerns.



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Special designs furnished for special jobs.

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Manufactured by
THE TURNER UNI-DRIVE CO.
1638 Central St., Kansas City, Mo.

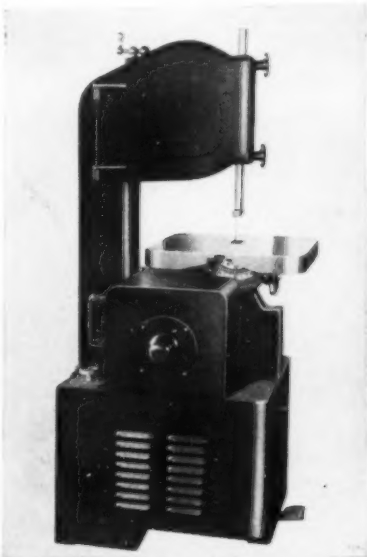
Grob Open End Band Saw Type OS14

A new open end band saw, designated as Model OS-14, is offered by Grob Brothers, Grafton, Wis. The machine is designed for sawing out medium and small sized dies, punches, stripper plates and miscellaneous parts.

The set up for internal sawing requires only 15 seconds. With equal ease the blade is removed from one opening into another, ready for sawing.

The machine accommodates saw blades $\frac{1}{8}$ " , $\frac{3}{16}$ " and $\frac{1}{4}$ " wide. Saw blades 150' long are wound helically on a drum which has a threaded groove. A multiple speed motor provides the forward or cutting speeds, and a second motor reverses the band at high speed. Due to special improved design, only 10 seconds are required to reverse the band, whereas, at the slow forward speed the cutting time is 2½ minutes.

Advantages claimed for this machine include, besides instant internal sawing, smooth cutting action at all times,



RED HEAD

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Let us tell you the many advantages of our new D. C. and A. C. models now available. Also, see our new line of Magnetic Parallels and Midget Chucks.

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PRINTZ ELECTRIC CO.

14595 KENTUCKY AVE.,
DETROIT, MICHIGAN

and also a positive drive to the blade. Since at no time a welded portion of the blade is passed through the work, smooth, clean cutting action is assured, making it possible to saw close to a line, and, a feature even more important, to use the blade as a notching



Drill Grinding Attachment

fits Black & Decker and Van Dorn grinders, sharpens twist drills correctly. Price only \$18.

C. H. Carlson Mfg. Co.
13-15 Main St., N. E.
Minneapolis, Minn.

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Lapping Compound Produces Perfect Fits--Quiet Operation

REDUCE COSTS by eliminating hand scraping and running-in operations.

SAFE—Use it on any type of surface. Will not charge into any metal or continue to cut.

Used by leading manufacturers for the past sixteen years for the fitting of all types of gears, bearings, valves, pistons, slides, etc.

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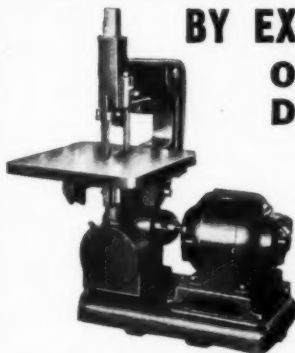
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roller or
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ings to
spindle***Write today for
circulars.***Burke Machine Tool Co.**
297 E. 16th St., Conneaut, Ohio

tool or as a file, since there is no welded joint to damage the sharp cutting edge of the die. By using the blade as if it were a file, small intricate dies can be finished within .001" - .002" to the line in a fraction of the time required using other methods.

It is emphasized that the positive drive to the saw blade is also advantageous. A friction drive requires a certain amount of tension to properly drive the saw blade, which means that some of the tensile strength of the blade is used for the drive, which is especially true when using narrow blades. On the open end type machine, the upper guide wheel places very little tension on the blade, just enough to keep it from being loose, so the entire strength of blade is used for sawing purposes.

Base of the machine is of welded steel construction; the column and table assembly is of cast iron. The table tilts four ways and measures 20" x 20". The control switches are in the rear. Push button to operate the machine is within convenient reach. The motors and drive are built into the base. The throat is 14"; the distance from floor to table is 40"; and the weight is approximately 1,000 pounds.

**Finland Sales
Representative**

Mr. Arvi Saari, Kaisanlemenk, 4 B 39, Helsinki, Finland, for the past fifteen years a commercial traveler and sales manager in the machine branch the last five years, is interested in representing American machine tool and equipment manufacturers in Finland.

**For Every
Coolant
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There's a GUSHER Coolant Pump of the proper type and the right size for every coolant need — and GUSHER Pumps stand up in the hardest kind of service.

They're self-priming—have fewer wearing parts—never require repacking—no metal-to-metal contacts—bearings are protected from abrasive matter.

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Machinery Co.,****538 E. FRONT ST., CINCINNATI, O.****GRIND THE
EASTERN CENTERLESS WAY****ACCURACY-FINE FINISHES-LOW COST****Large or Small Lots****EASTERN CENTERLESS GRINDING CO.****624 Capitol Ave., Hartford, Conn.**

T-J Rivitor for Airplanes

An effective broadside showing the use of the Tomkins-Johnson Rivitor in the aircraft industry has just been published. This bulletin contains many pictures dramatizing the application of the tool is riveting sheet metal parts together in curved as well as in straight sections.

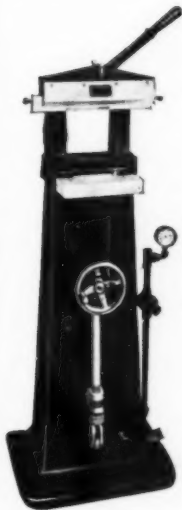
The T-J Rivitor features the automatic feeding of rivets, the visibility of

locating the work on the rivet and minimized spoilage. Foot pedal operation leaves the operator's hands free to handle the work. Locating and riveting is at eye level and pressures up to 12,000 pounds are available.

For your copy of this interesting Bulletin No. R-1A, write The Tomkins-Johnson Co., 605 N. Mechanic St., Jackson, Mich., and please mention The BLUE BOOK.

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Permanently



MODEL 25

PART NUMBERS, CATALOG NUMBERS,
HEAT NUMBERS, SERIAL NUMBERS,
PATENT NUMBERS
MANUFACTURER-INSTRUCTION DATA-INSPECTION

Positive, Permanent MARKING ON YOUR PRODUCTS ASSIST PROSPECTS TO ORDER, MAKES IT EASIER TO BUY—NEW, REPEATS AND REPAIRS. GIVES YOU A DEFINITE RECORD OF PERTINENT DATA ON EACH PART PRODUCED.

The Pneumatic Marking Machine ILLUSTRATED IS OUR HI-DUTY MODEL 25 GENERAL PURPOSE TOOL FOR SHORT RUNS OR PRODUCTION WORK. IT OPERATES FROM YOUR SHOP AIR LINE AND IS ONE OF NUMEROUS MODELS BUILT TO PRODUCE NEAT, PERMANENT MARKINGS QUICKLY ON METAL FABRICATIONS.

WE WILL BE HAPPY TO MAKE SPECIFIC RECOMMENDATIONS UPON RECEIPT OF SAMPLES OR PRINTS OF PARTS TO BE MARKED, SHOWING APPROXIMATE LETTERING, ITS LOCATION ON THE PART, WITH REQUIRED HOURLY PRODUCTION.

**MARKED PARTS ADVERTISE
IN THE RIGHT PLACE, AT THE RIGHT TIME.**

Unlike John Alden —

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GEO. T. SCHMIDT, Inc.

1802 Belle Plaine Ave., Chicago, Ill.
Builders of Marking Equipment Since 1895.

Send for complete
catalog of our full
line of marking
Tools, Machinery
and Equipment.

Hertzer & Zok Motorizing Equipment

Bulletin No. 31, just issued by Hertzer & Zook Co., Belleville, Pa., pictorially reviews the complete line of H & Z motor drives. This Company can supply motorizing equipment for all types of machine tools. The drives require practically no alterations of the machine, according to the manufacturer, and are constructed from alloy cast iron with designs to conform to the general lines and construction of the machines themselves.

The H & Z lathe drives for cone driven machines comprise a rigid one piece cast iron bracket, mounted on the back side of the lathe bed, held by four bolts, making a rigid mounting for balance of unit. The manufacturer stresses that the top of this bracket is machined for mounting the hinge bracket which supports the motor table and belt take-up device. Adjustment is provided for moving drive sideways when installing.

According to the manufacturer, all H & Z drives are so designed that

either a high speed or a slow speed motor may be used. When high speed motors are considered, there is a combination gear and Vee-belt reduction available to provide the desired speed on the cone shaft.

Other features include: — adjustments to accommodate different sizes and makes of motors, either new or



used; drives are designed with a belt take-up arrangement between the machine cone and the counter shaft cone, operated through a lever, ratchet and cam device.

KUTMORE HIGH SPEED

Adjustable Hollow Mills with
Twoway Micrometer Adjustment
Cutting capacities up to 2½".

Ask for Catalog No. 12.



Reisinger Mfg. Company
837 Lake Ave., ROCHESTER, N. Y.

VANDERBEEK Universal Joints

The "Baby Giant" Model illustrated is for instrument and control work. For heavy duty, we also offer the "Giant" Model with hardened and ground working surfaces.

Write TODAY telling us your requirements. We'll be glad to submit recommendations and prices—no obligation.

AMERICAN TOOL WORKS, INC., 26 Francis Ave., Hartford, Conn.



Two Welding Books by Hobart

Hobart announces two new vest pocket size books on welding. They are profusely illustrated and contain a lot of information on the uses of arc welding machines. Complete descriptions are also given concerning the manufacture of arc welders.

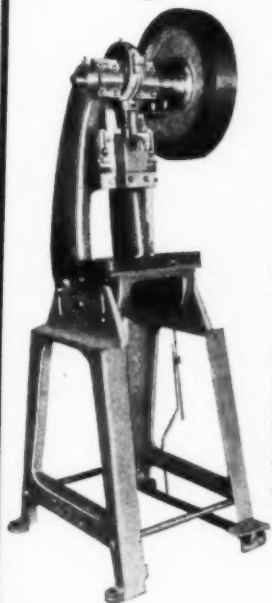
Production technique is thoroughly discussed in the factory booklet of 40

pages containing much that will be of interest to anyone who wants to know more about these machines and how they are made.

The other booklet, also 40 pages, presents a complete visual presentation of ways and means of using new methods in arc welding.

Address Hobart Brothers Company, Box TB-39, Troy, Ohio for copies and mention of The BLUE BOOK will be appreciated.

Why Tie-Up Big Presses With Small Jobs?



Big presses are for big jobs . . . it is inefficient, extravagant and wasteful to use them for Rousselle jobs . . . especially when you consider the low first cost and low operating cost of Rousselle Presses. These speedy, versatile units give you increased capacity with small investment and leave the big presses free for big jobs.

The No. 1 Rousselle is designed for trimming deep die castings and other deep draw work—jobs that previously demanded big presses because of the long stroke needed. With automatic feed, 10,000 operations per hour are possible. NON-REPEAT clutch stops after each stroke, or can be set to operate continuously.

Check These Specifications:

Weight	450-lbs.
Crankshaft diameter at main bearings	4"
Diameter of crankshaft	1 1/4"
Flywheel weight	120-lbs.
Speed	300-r. p. m.
Diameter of flywheel	16 1/2-inches
Ram standard stroke	2-inches
Adjustment of ram	2-inches
Size of bottom of ram	3x3"
Ram to bed; stroke down adjustment up	6 1/4"
Size of hole in ram for punch	1 1/4"
Bed size	8x12"
Depth of throat to center of ram	4-inches
Size of opening between press frame at back	6-inches
Inclinable angle from right angle	30-degrees
Height	36-inches
Thickness of bolster plate	1-inch

The Only Inclinable Punch Presses At These Low Prices:

No. 0 Rousselle - - - \$100

No. 1 Rousselle - - - \$150

(less motor and Stand; Stand No. 0 \$15.00 extra; and No. 1 \$25.00)

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The hardness and toughness of KENAMETAL causes centers supplied with these nibs to outlast centers of high speed steel 50 to 100 times. Will take speeds which would burn other metals —no galling or tearing.

You can purchase rough KENAMETAL Nibs from us and make your own tools, or buy KENAMETAL lathe and grinder centers in stock sizes.

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For Lathes, Hand Screw Machines, Grinders, and Mills

1. Simplicity and sturdiness adapt this center to heavy duty with extra long life.
2. Sufficient bearings for radial, thrust, and alignment loads resulting in 50% more radial load than the average live center.
3. Large spindle, small head, and short overhang spells rigidity—result, no chatter.
4. Has special oil seal to retain lubricant and resist foreign matter.

A folder giving prices and complete detail will be mailed to you just for the asking.

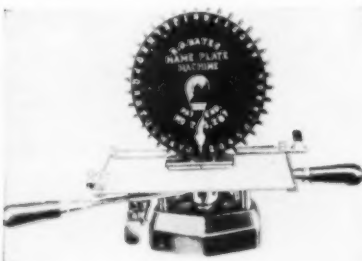
A lower first and last cost. Let us prove it by sending you one today for a ten day trial, and if not satisfactory in every way return it.

MOTOR TOOL MFG. CO.
12281 Turner Ave., Detroit, Mich.

Bates Name Plate Stamping Machine

Several innovations are announced by H. O. Bates, 251 No. Broad St., Elizabeth, N. J., in their Name Plate Stamping Machine. Improvements are in the table adjustment and automatic advance, also clamping bar that holds name plate. It is said that these more than double the marking speed formerly obtained with this machine.

The manufacturer points out the machine is sturdily constructed with screw pressure, screw feed and ball bearing spring clutch. The base and frame are constructed of strongly ribbed cast iron. Double slide table is of $\frac{1}{8}$ " steel, ample size to take name



plates up the 8" x 5". The up and down thickness may be adjusted a full $\frac{3}{8}$ ". The indexing pin is made of hardened steel.

The machine is furnished with dies assembled, any one size from $\frac{1}{16}$ " to $\frac{1}{4}$ ". Extra wheels with dies assembled are quickly mounted and are furnished by the manufacturer from stock. The engraved hand-cut dies are replaceable by loosening four screws in back of the dial.

Materials which may be stamped with this machine include, stainless steel, chromium-plated steel, brass, copper, bronze, fibre, bakelite or other plastics, wood and other materials. When writing for more information, please mention The BLUE BOOK.

Apex-Phillips Manual

A combination 12 page catalog, manual and price list on Apex-Phillips Screwdrivers and Bits for electric, air and spiral drivers has just been issued by The Apex Machine & Tool Co., Dayton, Ohio.

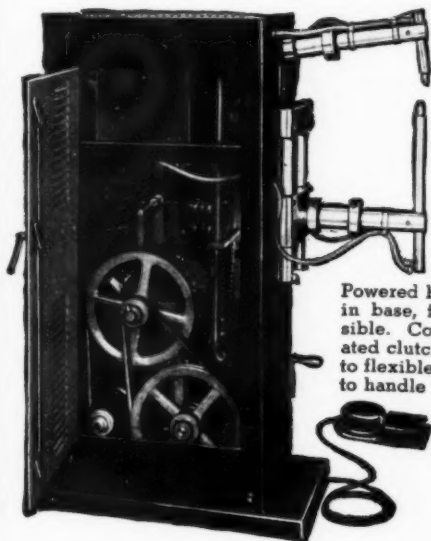
The manual is designed to supply Tool Supervisors, Production Engineers, Master Mechanics and Purchasing Agents with detailed information regarding drivers for Phillips recessed head screws and slotted head screws.

Two tables are given for determining the correct bit size for Phillips wood, machine, and sheet metal screws and stove bolts, and for flat, oval, binding and round head slotted screws. Power bits are illustrated for 32 makes and styles of power drivers as well as hand drivers, and those specially designed for specific purposes.

The catalog is bound in an attractive, durable cover to withstand excessive handling. Copies will be sent free on request and we'll appreciate mention of this magazine.

ACE SPOT WELDERS

MOTOR DRIVEN, AUTOMATIC



For high speed, dependable spot welding with precision of pressure and accuracy of timing heretofore available only in high priced equipment. Speeds from 40 to 120 spot welds per minute.

Mechanical operation eliminates fatigue, speeds up production and cuts labor costs.

Powered by self contained unit mounted in base, fully enclosed, easily accessible. Controlled by magnetically operated clutch through foot switch attached to flexible cable. Operator's hands free to handle work.

Made in 4 Sizes from 15 to 50 KW. Write for Bulletin MD-120.

For information on foot operated ACE Spot Welders ask for Bulletin 62.

Send today for literature and prices.

PIER EQUIPMENT MFG. CO.

WELDING EQUIPMENT DIVISION

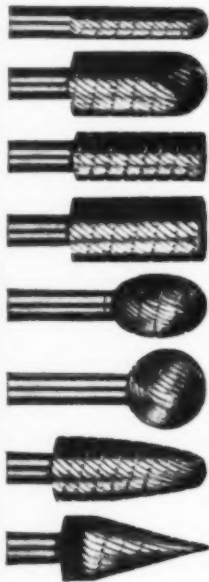
646 Cross Street,

Benton Harbor, Michigan

JARVIS

GROUND FROM THE SOLID ROTARY FILES

In precision grinding the flutes into the solid hardened blanks of the Jarvis Rotary Files, a tool is produced which is the most economical to use for finishing work on metal patterns, aluminum and bronze castings and many other machineable materials. Grinding from the solid after hardening results in tougher and keener edged teeth. Jarvis precision ground files can be reground many times at a fraction of their original cost.



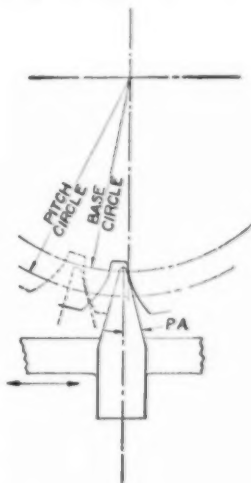
ASK FOR CATALOG MST.

Chas. L. Jarvis Co.
MIDDLETOWN • CONN.

Michigan Tool Involute Checker

A new model involute checker for production and laboratory checking of gears is announced by Michigan Tool Co., Detroit. The checker is particularly notable for its easier set-up—useful when checking varieties of gears.

The indicating head of the involute checker now checks gears from a pitch diameter, using a master rack tooth which contacts the gear tooth, instead of the conventional pointer. The correctness of this method of checking, regardless of gear specification is illustrated in the diagram in the accompanying illustration.

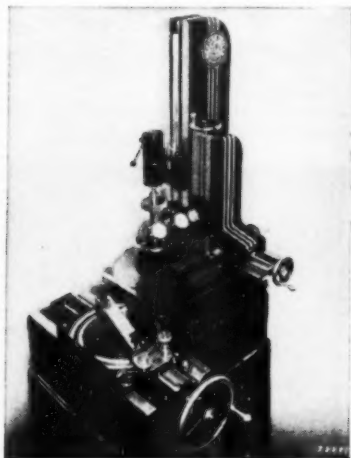


Since involute forms are generated from a base diameter, the tangential movement of the rack tooth with relation to the gear is directly proportional to the angular rotation of the gear, regardless of pressure angle and diameter. The actual amount of movement depends upon the base diameter of the gear and pressure angle of the rack.

The setting of the sine bar on the machine to provide this correct amount of movement is determined by simple

calculation. Except for this variation in setting up the machine, gear checking is identical to the procedure followed when using a tracing finger.

The design eliminates the problem of accurate adjustment to depth of the pointer in a gear with relation to the base diameter of the gear being checked, the master rack tooth being merely moved into contact with the gear tooth. (Tracing type fingers are also available, if desired.)



The new checker is provided with a full master base circle integral with the work holding spindle, providing greater accuracy, better balance and allowing greater rotation of the gear and work spindle.

The sine-bar which acts as a compensator for difference between the length of arc of the master disc and of the base circle of the gear being checked (per degree of rotation) is now mounted on a carriage moved by a lead screw.

A single eccentric clamp is now provided on the tail stock for rapid set-up of different length of gears and arbors. An indicator elevating screw is provided for quicker adjustment.

JARVIS

FLEXIBLE SHAFTS AND MACHINES



may be obtained in single or multiple units in floor, overhead suspended or bench type. They are available in speeds from 500 to 18,000 RPM.

Jarvis Flexible Shaft Machines

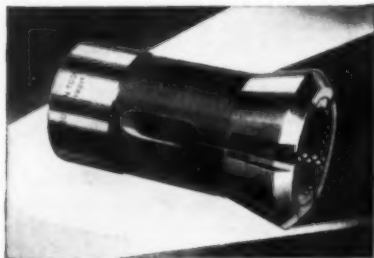
are indispensable for your finishing operations.



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Spotlighted **For Hot-Rolled Stock**



DIAMOND-GRIP Compensating Master Collet with diamond- serrated Pads

◆◆ Pads of the Sutton Compensating Master Collet are self-adjusting in the master so that they automatically rock to a perfect bearing on the stock. This advantage permits this collet to be used on hot-rolled stock that is within mill tolerance ◆◆ No pins or screws are used to hold the pads in the master. Pads are interchangeable so that one master and different sets of pads equip a machine.

*Complete listings of all styles of
 DIAMOND-GRIP Collets for
 all screw machines in Sutton
 Catalog 12. Send for a copy.*

SUTTON TOOL COMPANY

2842 W. GRAND BLVD., DETROIT, MICH.

Represented in Canada by

HI-SPEED TOOLS, Ltd Galt, Ont.



Accessories for Screw Machines

The new involute checkers are attractively streamlined and available in various column heights. Illustrated is the high-column model designed to take care of gears ranging up to 26 inches between centers—such as long shaft gears. The standard model has a column height designed to take care of gears requiring 18 inches of clearance between head and tail-stock.

Allis Chalmers Vari-Pitch Drive

Bulletin 1266 is one of the latest catalogs published by Allis-Chalmers, Milwaukee, Wis. This attractive bulletin gives a full description of the vari-pitch speed changer.



This new variable speed transmission occupies much less space than the ordinary transmissions, according to the manufacturer. Double shaft extensions allow installation wherever desired. It is not necessary to stop the machine to change speed. The Allis-Chalmers speed changer also comes equipped with electrical finger-tip control for easier, faster speed changes.

The Vari-Pitch Speed Changer is available in sizes from 1 to 33 h.p., ratios up to 3 $\frac{1}{2}$ to 1, maximum output speed 3500 r.p.m.

When writing for further information or your copy of bulletin 1266, we'll appreciate mention of **The BLUE BOOK**.

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NEW LOW PRICES—

Only \$285 for Set No. 1 containing 81 blocks combining to form 120,000 different sized gages.

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FORD MOTOR COMPANY

Johansson Division, Dept. C
Dearborn, Mich.

Please send me, free, copies
of new Catalog No. 14.

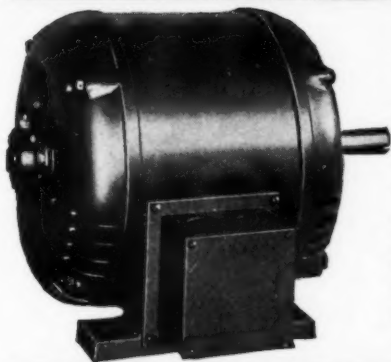
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STAR Products have a background of 25 years of manufacturing experience in this very specialized field of electrical equipment. It would be difficult to duplicate quickly, the sum total of experience and knowledge which the STAR Organization represents.

Consult us regarding your needs in Electric Motors of all kinds, Generators, Dynamos, Converters, Gear Motors, Brake Motors - special designs to meet your needs.

AC & DC Motors Up to 250 H.P.

★ STAR ELECTRIC MOTOR CO., Bloomfield, New Jersey ★

Midwest Cutting Tool Catalog

The Midwest Tool & Mfg. Co., 2267 W. Jefferson Ave., Detroit, Mich., announces a new catalog of 112 pages, listing their complete line of cutting tools and holders. Full description and specifications of the line is presented attractively in this new catalog, including carbide-tipped reamers, drills, endmills of all sizes, form tools, keyway cutters, milling cutters of all

sizes and kinds, reamers, saw blades and spot face bars, adjustable water-cool holders, fluting holders, and an assorted variety of tipped tools in every type, design, and variety.

All tools and holders are illustrated with photographs and drawings. The drawings bearing letters and numbers to correlate with tables of specifications giving sizes and dimensions. Results of the photographs and descriptions of the carbide tipped reamers and cutters, a number of pages are devoted to shapes and dimensions of carbide standard blanks.

Upon request, the company will send this latest catalog to you immediately. When writing, your mention of The BLUE BOOK will be appreciated.



TRICO AUTOMATIC OILERS

SAVE TIME-OIL-WORRY

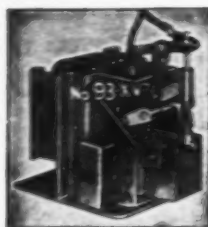
OPTIMETICS and LEVERMATIC
 guarantee a constant flow of oil in any and all bearings.

The **DRIP-DRIP** is a thermal oiler dropping oil on the bearing from the top exactly as needed.

TRICO PUMP MFG. CO.
 MILWAUKEE, WIS. U. S. A.

Potts Adds Bronze Bearing Line

In another step toward meeting the requirements of industry, the Worcester T. Potts Co. announces the addition of



Our line of standard and special electric spot welders is most complete—everything from $\frac{1}{4}$ to 500 K. V. A., some as low as \$25.00.

We manufacture a very complete line of welding tips and water-cooled electrode holders for difficult welding jobs.

"If it's a Spot Welder, we make it"—from a filament .0005" to a door welding.

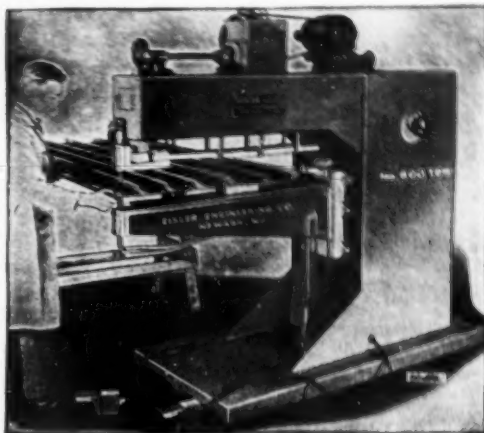
We make special welding transformers to suit your requirements.

Send us your welding problems for quotations.

We also do Job Spot Welding.

EISLER ENGINEERING COMPANY, Inc.

762 So. 13th St., Near Avon Ave., Newark, New Jersey



a line of bronze products to its already complete line of iron and steel products. The new line includes all sizes of standard bronze machine bearings and precision bronze bars, both solid and cored, as produced by the Bunting Brass & Bronze Co., of Toledo, Ohio.

This new service includes consultation and technical assistance. Stocks are now completed in the Potts Warehouse, ready for immediate delivery. Literature and catalogs, giving full description and dimensions of the new

bronze line can be obtained by writing to the Company, East Erie Avenue and D Street, Philadelphia, Pa.

The Potts Company already handles a large stock of Anaconda free-cutting brass rods as part of its complete ware-house service covering everything from machinery, stainless and structural steels to non-ferrous metals, welding accessories and home and industrial fencing.

Hope you will mention The BLUE BOOK in writing.



TAKE A TIP FROM TALIDE

**ON PRODUCTION—
IT PAYS TO USE**

TUNGSTEN CARBIDE BUSHINGS

DRILL JIG BUSHINGS of Solid Tungsten Carbide Metal are available in all sizes, styles, and shapes. These Super-Hard Bushings give you maximum assurance of **LONG LIFE** and **ACCURATE** performance on your most exacting requirements.



PLUG and RING GAGES of Solid Tungsten Carbide are guaranteed to **MAINTAIN THEIR SIZE** to .0001" and are not affected by changes in room temperature. Inspection and sizing tests are thus assured of accuracy plus.

BURNISHING ROLLERS of Solid Tungsten Carbide possess the highest degree of **HARDNESS** and **SURFACE PERFECTION**. They easily burnish out all wheel and tool marks left on your finished parts—and produce clear, smooth, and highly polished surfaces.

LONG LIFE! ACCURACY! SIZE MAINTENANCE! FINISH!
TUNGSTEN CARBIDE PIECES OF ANY SIZE OR LENGTH!

METAL CARBIDES CORP. • YOUNGSTOWN, OHIO

Midwest Cutting Tool Catalog

The Midwest Tool & Mfg. Co., 2367 W. Jefferson Ave., Detroit, Mich., announce a new catalog of 112 pages, listing their complete line of cutting tools and holders. Full description and specifications of the line is presented attractively in this new catalog, including counterbores, countersinks, drills, endmills of all kinds, form tools, key-way cutters, milling cutters of all

types and kinds, reamers, spot facers and spot facer bars, adjustable extension holders, floating holders, and cemented carbide tipped tools in every type, design, and variety.

All tools and holders are illustrated with photographs and drawings, the drawings bearing letters and numbers to coincide with tables of specifications giving sizes and dimension. Besides the photographs and descriptions of the carbide tipped reamers and cutters, a number of pages are devoted to shapes and dimensions of carbide standard blanks.

Upon request, the company will send this latest catalog to you immediately. When writing, your mention of The BLUE BOOK will be appreciated.

TRICO AUTOMATIC OILERS

SAVE TIME—OIL—WORRY

OPTOMATICS and LEVOMATICS maintain a constant level of oil in ring and ball bearings.

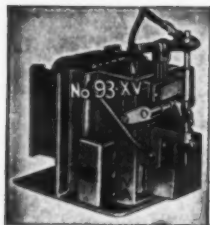
The DRIP-DROP is a thermal oiler dropping oil on the bearing from the top exactly as needed.

TRICO FUSE MFG. CO. WHITE FOR LITERATURE
MILWAUKEE, WIS., U. S. A.



Potts Adds Bronze Bearing Line

In another step toward meeting the requirements of industry, the Horace T. Potts Co. announces the addition of



Our line of standard and special electric spot welders is most complete—everything from ¼ to 500 K. V. A., some as low as \$25.00.

We manufacture a very complete line of welding tips and water-cooled electrode holders for difficult welding jobs.

"If it's a Spot Welder, we make it"—from a filament .0005" to a door welding.

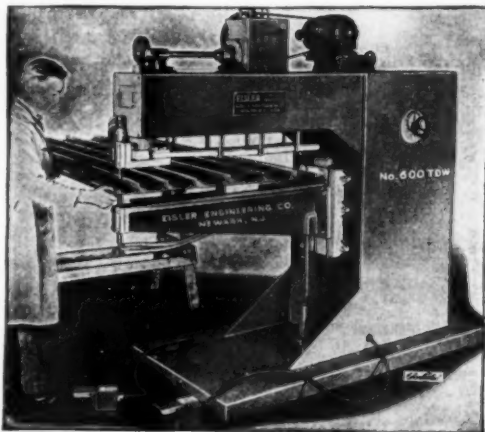
We make special welding transformers to suit your requirements.

Send us your welding problems for quotations.

We also do Job Spot Welding.

EISLER ENGINEERING COMPANY, Inc.

762 So. 13th St., Near Aven Ave.,
Newark, New Jersey



a line of bronze products to its already complete line of iron and steel products. The new line includes all sizes of standard bronze machine bearings and precision bronze bars, both solid and cored, as produced by the Bunting Brass & Bronze Co., of Toledo, Ohio.

This new service includes consultation and technical assistance. Stocks are now completed in the Potts Warehouse, ready for immediate delivery. Literature and catalogs, giving full description and dimensions of the new

bronze line can be obtained by writing to the Company, East Erie Avenue and D Street, Philadelphia, Pa.

The Potts Company already handles a large stock of Anaconda free-cutting brass rods as part of its complete ware-house service covering everything from machinery, stainless and structural steels to non-ferrous metals, welding accessories and home and industrial fencing.

Hope you will mention The BLUE BOOK in writing.



TAKE A TIP FROM TALIDE

**ON PRODUCTION—
IT PAYS TO USE**

TUNGSTEN CARBIDE BUSHINGS

DRILL JIG BUSHINGS of Solid Tungsten Carbide Metal are available in all sizes, styles, and shapes. These Super-Hard Bushings give you maximum assurance of **LONG LIFE** and **ACCURATE** performance on your most exacting requirements.



PLUG and RING GAGES of Solid Tungsten Carbide are guaranteed to **MAINTAIN THEIR SIZE** to .0001" and are not affected by changes in room temperature. Inspection and sizing tests are thus assured of accuracy plus.

BURNISHING ROLLERS of Solid Tungsten Carbide possess the highest degree of **HARDNESS** and **SURFACE PERFECTION**. They easily burnish out all wheel and tool marks left on your finished parts—and produce clear, smooth, and highly polished surfaces.

**LONG LIFE! ACCURACY! SIZE MAINTENANCE! FINISH!
TUNGSTEN CARBIDE PIECES OF ANY SIZE OR LENGTH!**

METAL CARBIDES CORP. • YOUNGSTOWN, OHIO

ARMSTRONG Drop Forged Lathe Dogs

Accurately proportioned and balanced, drop forged from special open hearth steel and heat treated. Alloy steel screws hardened at point. Hubs oversize to permit re-tapping give double life.



Write
for Circular

ARMSTRONG BROS. TOOL CO.
"The Tool Holder People"
308 N. Francisco Ave., Chicago, U.S.A.

LITTELL Air-Blast Valve for Faster Safer Production



PAYS its cost in a few weeks time in — increased production — greater safety — economy of air. Automatically ejects pieces. Operator's hands are never in danger zone. Quickly adjustable air nozzle.

Automatic Roll Feeds—

dial feeds, magazine feeds, hopper feeds, for punch presses. Reels for coiled stock. Send for Circulars.

F. J. Littell Machine Co.
4153 RAVENSWOOD AVE., CHICAGO, ILL.

Ames Indicators

Four new 10,000th inch jeweled indicators have been developed by the B. C. Ames Co., Waltham, Mass. The manufacturer stresses the point that these indicators are all accurate to .000025" and sensitive to .00001", with .020" spindle travel.

In developing these indicators a perfect tooth form was generated, and the teeth were milled with three cuts on special automatic machines. These teeth are then hardened and ground to assure long life.



Rigid supports for the hardened and ground staffs are attached to thick plates. Jewel bearings (natural sapphires) for every staff have olive holes, and the staffs end-shake against them. The plates also support the patented wire-attached bezels.

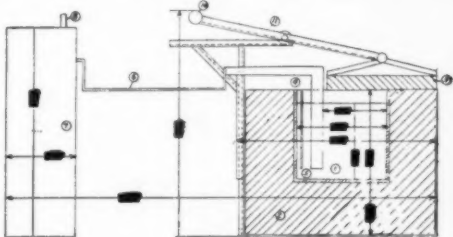
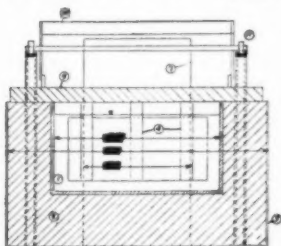
The contact points are carbide tipped to eliminate wear which might affect the sensitivity of the dial readings.

Other features of the indicators are the thick section cases of brass, machined all over; finger-fit crystals that are easy to replace; cup dials that need no springs and eliminate shadows; full chromium plating throughout.

When writing please mention The BLUE BOOK.

A New Furnace by Holden

The characteristics of a new 3 Phase Electrode Furnace developed by The A. F. Holden Co., New Haven, Conn., are shown in the accompanying sketch.



This furnace is said to have several new features never before used in any equipment offered to industry, viz:

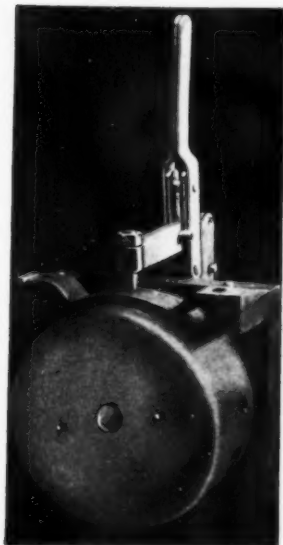
1. A new method is provided which prevents current passing to the pot wall. The user is assured that no heat is generated in the rear

wall of the pot. No warpage of the pot wall toward the electrodes, plus longer pot life.

2. This 3 Phase Unit provides electrodes in sets of three. Current

density of the electrodes is 50% lower than electrodes arranged in pairs.

Advantages claimed for this design include twice the electrode life and low rate of change in chemistry bath materials.



KNU - SINE Toggle Clamps

Universal action toggle clamps manufactured by the world's largest exclusive producer of clamping fixtures. They are ideal for use in jigs, dies and fixtures where speed of insertion and removal of part is a factor to consider. Positive clamping, hundreds of applications.

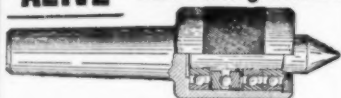
*Write for illustrated
catalog.*

MFD. BY:-



KNU-VISE PRODUCTS CO.

6436 CASS AVENUE, DETROIT, MICH.
EASTERN OFFICE: 1805 N. 13th ST., PHILA., PA.

"ALIVE" Ball Bearing Centers**"They turn with the work"**

Write TODAY — and let us tell you more about them.

MODERN MACHINE CORP.
323 Berry St., Brooklyn, N. Y.**BURR KEYSEATERS**

Mill keyways in the run or on the ends of shafting already erected — save money on alteration, erection, and repair work.

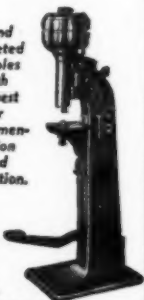
Made in 4 sizes, for hand or motor operation.

Write for Bulletins and prices.

JOHN T. BURR & SON
429 Kent Ave., Brooklyn, N. Y.**GRANT RIVETERS**

include both Noiseless Spinning and Vibrating Hammer types of machines — also Vertical and Horizontal Multiple Spindle Spinning Machines.

Send unriveted samples with request for recommendation and quotation.

**THE GRANT MFG. & MACHINE CO.**
C. E. Station
BRIDGEPORT, CONN.

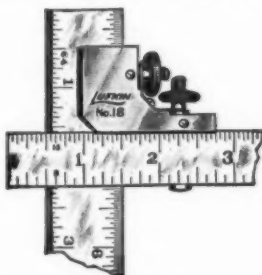
A new type of cover permits loading or unloading from either front or sides.

Parts designated by numbers on the print are: 1. Metal Pot, 2. Heat Insulation, 3. Furnace Shell, 4. Electrodes, 5. Baffle Plate, 6. Bus Bar Connection, 7. Transformer, 8. The Tap Changing Plug, 9. Cover, 10. Counter Weight, 11. Cover Suspension.

For further details please address the Company, and we'll appreciate mention of The BLUE BOOK

Lufkin Right Angle Rule Clamp

Another improved item just added to the line of precision tools made by The Lufkin Rule Co., Saginaw, Mich.,



is the Right Angle Rule Clamp. It will firmly hold at right angles a combination square blade (of 12, 18 or 24-inch length) and any regular steel rule not over one inch wide. So combined and employed with the heads of a Combination Square, many valuable applications and uses are found. This Clamp can also be applied to thin steel squares.

The clip with prongs at each end, pictured above, is a feature of the Lufkin Rule Clamp. These prongs at all times hold both clamp nuts in place. Thus interference of the two bolts and nuts is eliminated. Thumb nuts of this Right Angle Rule Clamp No. 18-A are knurled for good grip and of size most convenient to operate.

Please mention The BLUE BOOK.

File Facts

There are hundreds of shapes, kinds and sizes of files, and two broad classifications by which files are generally known. These classes refer to the teeth which are designated as Single-cut and Double-cut. A Single-cut file has single rows of parallel teeth, extending the length of the file at an angle across its face. The Double-cut files have two parallel rows of teeth

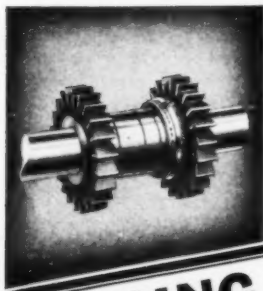
crossing each other. The first row is usually coarser and deeper than the second. The first row of teeth is known as the "over-cut" and the second as the "up-cut."

Teeth of a Double-cut file are sharp points. For that reason, they cut faster but not so smoothly as Single-cut teeth. Most files used by machinists are Double-cut.

Single and Double-cut files in general use are further classified according to

the distance between the rows of teeth: — Bastard, Second - Cut and Smooth. Those having the greatest space between teeth are known as "Bastard." Those with the least space are called "Smooth." While files are made with coarser teeth than "Bastard" cut, and some with finer teeth than "Smooth" cut, these have a limited use in industry.

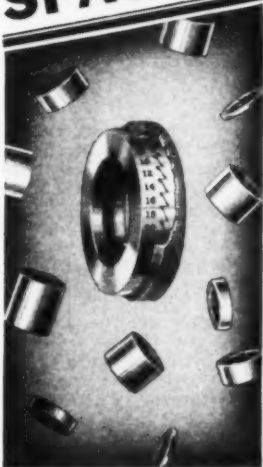
This information and a great deal more is given in an interesting booklet entitled "File Facts." It is published by the Simonds Saw and Steel Co., Fitchburg, Mass. Copies may be obtained from the branch offices at 1350 Columbia Road, Boston; 127 So. Green St., Chicago; 311 S. W. First Ave., Portland; or 228 First Ave., San Francisco.



**FOR ALL MAKES
OF MACHINES**

**Adjustable
and Solid**

SPACING COLLARS



Adjustable Spacing Collars

For straddle milling, gang milling and multiple slotting set-ups. They eliminate the use of shims.

Solid Spacing Collars
Are standard .001" to 3" thick. Less than 1/8" are not hardened.



**SCULLY-JONES
and COMPANY**
1905 S. Rockwell St.,
CHICAGO, ILLINOIS

BEST VALUES ON THE MARKET

Try It FOR 10 DAYS
WITHOUT OBLIGATION

We are Confident...THIS
CLEMENTS

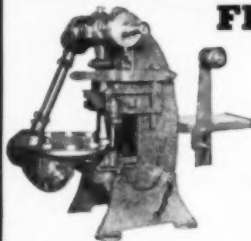
CADILLAC 2 SPEED
PORTABLE ELECTRIC

BLOWER and SUCTION CLEANER
WILL MEET ALL YOUR
CLEANING REQUIREMENTS



WRITE FOR DESCRIPTIVE CIRCULAR
CLEMENTS Mfg. Co.
6430 S. HARRISANSETT AVE. CHICAGO, ILL.

FEDERAL DIAL FEEDS



**"Built
for
Service"**

You can increase production and reduce costs with these dependable modern feeds—on multiple, reforming or assembling operations—with safety to the operators. Federal Dial Feeds are available in eight models to meet your requirements.

**Send TODAY for bulletin giving
complete information.**

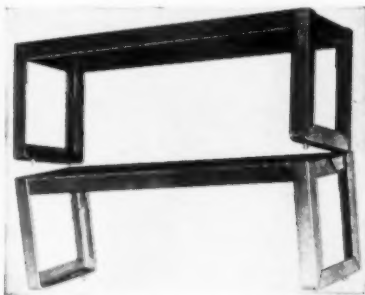
The Federal Press Co.
ELKHART, INDIANA

Two types are offered:—the 2000 pound capacity model with chain lift and the 1250 pound capacity model with cable lift. Or the die table can be custom built for capacities to 5000 pounds.

Please mention The BLUE BOOK in writing.

"Mac" Shelving

The Sterling Factory Equipment Co. Inc. of Providence, R. I. offers a new type steel shelving unit that can be built up a shelf at a time. The Unit is called the "Mac Shelf," and combines shelf and end angles in one unit, the angles being formed into inverted U's which are welded to the shelf. These U's can be provided in varying heights to furnish desired shelf spacing.



No bolts, clips or other means of fastening is necessary. It does not have to be assembled on the floor, in one place and moved to permanent location.

One "Mac" Unit rests on top of another, being held in position by studs. They are hooked together automatically at the back as one unit is set on top of another.

The main features are rigidity, convenience and flexibility. In addition to quick setup, can be readily relocated.

"Mac" Shelves are constructed of 18 ga. steel in regular shelving sizes. End angles are $1\frac{1}{4}$ " x $1\frac{1}{4}$ " and vary in height from $4\frac{1}{2}$ " to 18". Shelves are reinforced at corners.

BEST VALUES ON THE MARKET

10½"

FULL UNIVERSAL DIVIDING HEAD

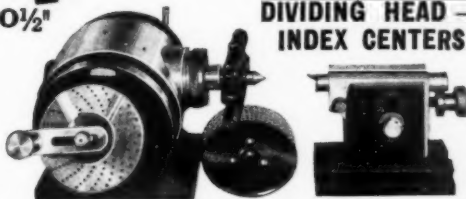


for Universal Milling Machines—Can be furnished right or left hand. Actual swing 11°. Swivel head stock graduated 180 degrees. Tilts above and below perpendicular. Spindle has No. 10 B. & S. taper front and back with tapered bearing and thrust collar. NEW LOW PRICE

\$170

10½"

DIVIDING HEAD — INDEX CENTERS



The utmost in a well-balanced, rigid and accurate index center. Swivel stock graduated up to 180 degrees. Head tilts above and below vertical and perpendicular lines. Spindle has taper bearing, with take-up collar for end thrust. No. 10 B. & S. taper has large hole through spindle. NEW LOW PRICE

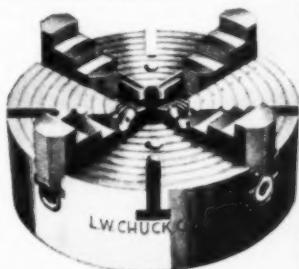
\$110

INDEPENDENT CHUCKS

Sturdy semi-steel, heavily ribbed body to withstand strains. Ground finish. Four independent accurately ground and fitted hardened steel jaws. Reversible. ¼" tough nickel steel screws. 12" size weighs 75 lbs.

NEW LOW PRICES

10" Size...	\$27.00
12" Size...	31.00
14" Size...	36.00
16" Size...	45.00
18" Size...	58.50



SAVE MONEY

ON

Lathe Chucks
Dividing Heads
Magnetic Chucks
Demagnetizers
Milling Machine
Vises
Power Hack Saws

Best Values
ever offered!

Send
Today for
NEW free
Catalog

L-W CHUCK CO.

1-7 N. ST. CLAIR ST.,

TOLEDO, OHIO

THE MODERN

HANDEE

TOOL OF 1001 USES



A dozen times a day the Handee may be called into em part on a machine without removing the part and hav edges on dies or molds—to bore small holes in any ma find the Handee indispensable in experimental laboratory of regular production jobs.

FAST

Special custom-built motor develops 25,000 r.p.m.— plenty of speed for any operation. If you require different or variable speeds, inexpensive foot or bench controls are available.

SMOOTH

Precision, selected, grease-sealed, ball-bearing construction insures vibrationless performance.

STURDY

7-segment commutator. Aluminum alloy, seamless housing with shock-proof bakelite ends. Stands hard industrial usage.

LIGHT

Weights only 12 oz. Perfectly balanced. Can be used all day without fatigue.

AIR COOLED

New type radial fan draws cool air through motor. Can't overheat.

STREAMLINED

Fits the hand comfortably. Handles as easily as a pencil. No awkward bumps or projections on housing.

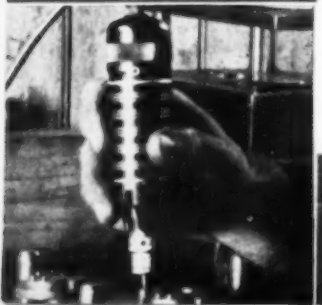
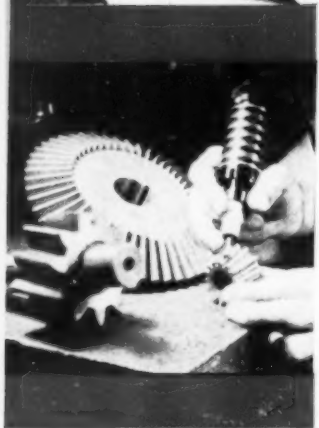
VERSATILE

Your choice of 300 fine accessories for every kind of work.

PORTABLE

Carry from job to job. Plug in any electric outlet and set up shop on the spot.

Large and small industries are turning to Handee, recognized as the greatest value by engineering and efficiency authorities everywhere.



CHICAGO WHEEL & MFG. CO.

Originators and Pioneers of Mounted Wheels for Industry

1101 W. Monroe St., Dept. HB, Chicago, Ill.

Canadian Distributors: Canadian Trade Corp., Ltd.

1000 W. 10th St., Winnipeg, Man.

THE MODERN TROUBLE SHOOTER

into emergency service—to repair some hard-to-get-at
t and having the machine idle—to smooth off rough
n any material—to clean delicate mechanisms. You'll
laboratory and in model and tool room, also for scores

Router-Shaper Set

Three strong fixtures, accurately machined and polished. Bench Holder (illustrated) for high speed spindle carving, grinding, etc. Shaper for 20 different molding cuts. Router for inlaying, veining, etc. \$12.50 complete with 3 accessories.



Chicago Mounted Wheels

For use with Standard, DeLuxe and "High Power" Handees, also other industrial equipment. Famed everywhere for great efficiency and long life. Now available in all sizes. Mounted on shanks to fit any type chuck—in a wide range of grains and grades.

New, 64-Page Catalog

Complete information on all Handee products, including the largest assortment of accessories ever presented, one to fit every special job.

Hardware and Mill Supply Dealers everywhere carry and recommend the Handee. Order through them or direct on 10-Days Trial.

Grinds Sands
Drills Saws
Polishes Sharpens
Cuts Engraves
Routs Cleans
Curves Etc.

This
Picture
is
Actual
Size



De Luxe
Model

\$1850

Postpaid

6 Accessories Free

There Are More Handees in Use Today
Than All Other Similar Tools Combined

G. CO.
for Industry
ago, Ill.
Corporation

The ONLY COMPLETE Tool Salvage Service

Coast to Coast



You'll find in this World's largest Tool Reconditioning Service, every facility for restoring to original efficiency, all types, sizes and kinds of tools. In addition to complete modern plants, a Coast-to-Coast organization is ready to assist you in your tool problems.

Pneumatic tools are rebuilt with new parts. Chrome plated parts are guaranteed to give at least 100% more service than original parts.



High speed tools are expertly recut—pneumatic tools restored to standard size with Hard Chrome—parts, tools and dies Hard Chrome Plated for extended life.

This complete, all inclusive Service points the way to lower tool and production costs—to longer tool life—to maximum tool efficiency. Every detail of the Service is explained in our new 40-page catalog. A separate catalog covers Hard Chrome Plating.

Write **TODAY** for these catalogs—no obligation.



**EASTERN CUTTER
SALVAGE CORP.**

**MASTER TOOL
CO., INC.**

**THE MASTER
CHROME SERVICE, INC.**

"Straphanger's Rolls-Royce"

A new rubber - spring, aluminum-bodied rapid transit car for which eight traction motors provide a get-away rivalling that of a high powered automobile, made its debut on the Brooklyn-Manhattan Transit system tracks recently.

Manufactured by Clark Equipment Co., of Battle Creek, Mich., the new unit, through the use of eight 720 h.p. motors, develops twice as much horse-

power per pound of material as the conventional type of car and accelerates to a speed exceeding 20 miles an hour in only six seconds.

In addition to its racing start, the fast stepping car has a normal cruising speed of forty miles an hour. The motors were developed by the General Electric Company.

The car is said by transit authorities to be the first rapid transit car entirely sprung on rubber, with all metal to metal contact eliminated to give a smooth and silent ride.

The car is divided into three articulated compartments so that it flexes easily rounding curves. This and the use of lightweight metals throughout the car make it possible to utilize the Clark-type trucks with the B. F. Goodrich Company's rubber "sandwich" super-resilient wheels and rubber springs. The Aluminum Company of America supplied duralumin for the body, thus bringing to the rapid transit field a new material largely developed for aviation and making possible a further reduction in weight.

Among the outstanding innovations incorporated in the new car are the "resilient wheels" which are insulated from vibrations, switch-over and corrugation jolts by rubber "sandwiches," and conical rubber springs, consisting of rubber in shear bonded to steel; both developments of Goodrich.



FEDERAL

**UNIVERSAL
TEST
INDICATORS**

Point swivels 190°
Point motion, reversible.
Universal clamp and bar. Exceedingly accurate and sensitive.

MODEL ONE
Graduated 1/1000"
Range030"

MODEL TWO
Graduated 1/10,000"
Range008"

Actual Size

Send for catalog

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1144 EDDY STREET, PROVIDENCE, R. I.
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ERRINGTON MECHANICAL LABORATORY

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Chicago Office:

6415 N. RICHMOND STREET

New York Office:

200 BROADWAY

Boston Office:

830 OLD SOUTH BLDG.

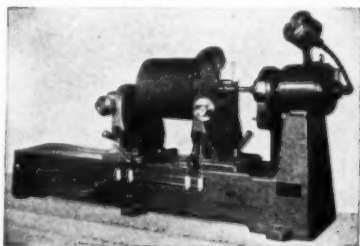
**Globe Iron Equipoise
Dynamic Balancing
Machine**

The Globe Tool & Engineering Co., Dayton, Ohio announces a new series of dynamic balancing machines, to be known as a Neon Equipoise Dynamic Balancers.

It is claimed that these new units completely neutralize any unbalance in any plane selected by the operator, giving accurate reading as to angle and amount of unbalance in the other plane.

In dynamic balancing, two separate and distinct planes are selected for adding correction and these planes are known as the correction planes. They may be close together or far apart and may bear any number of relations to the journals of the part being balanced. They should, of course, always be as far apart as possible to produce effective weights as far from the center of gravity as possible.

It is explained that the objective is to be able to read the exact amount of unbalance in both of these planes so



that proper corrective weights may be added. It is evident that it is necessary then to neutralize all unbalance in the one plane while the other plane is being read. As the balancing evolved from the initial crude machine, where the amount of unbalance was guessed at, and the angle of unbalance was found with a pencil which would mark

the shaft, the ultimate aim of the engineer developing balancing machines has been to produce a machine that would neutralize the unbalance in one plane completely while the other was being read. To produce this result, large heavy cradles were used and in some cases the whole heavy cast iron machine bed was made into a cradle with fulcrums applied under one correction plane.

One other principle that the engineers and inventors on balancing machines have had to encounter has been accuracy of balance and the only way this can be achieved is to keep the weight ratio of the mounting of the part to be balanced to the actual part to be balanced as low as possible. This means that a simple saddle mounting as light as possible should be used and if it can weigh 1/10 to 1/100 of the part being balanced, then really accurate balance can be obtained.

The makers assert that with the

Equipoise, they have retained all of the good points of the past "N" series machines, keeping its ultimate precision in accuracy and have added the Equipoise bar to obtain the maximum gains in reading the exact amount of unbalance at the exact angle in any plane that the operator wants to select, completely neutralizing all unbalance in the other plane regardless of angle or amount.

This new Equipoise feature can be added to any of the older "N" series Dynamic Balancers made by this Company, and in fact, can be adapted to other Dynamic Balancers made by other companies which do not cover this feature.

The machine illustrated is No. NE-1 and will take weights from 1 to 25 pounds—swing 15°. All sizes of machines manufactured will have this new Equipoise feature available, handling weights from a few ounces to 14,000 pounds.

Please mention The BLUE BOOK in writing.

"POWERMASTER"

Increases Production

It gives you just the right speed for the job, with an infinitely variable speed range under finger-tip control. There are no belts to shift. Machines can be located independently of lineshafting. Operation is speedier and more flexible.



You can readily attach "POWERMASTER" to most machine tools with a simple four-bolt mounting.

UNCONDITIONALLY GUARANTEED—

Write for details and price

"POWERMASTER"

25 East Fourth St., New York, N.Y.

POPULAR Hotel FORT WAYNE

In addition to the superior accommodations at the Fort Wayne, guests enjoy a superb location in a residential community, yet convenient to the business districts. Hotel Fort Wayne provides economy without sacrifice of comfort or location.

**300 ROOMS
FROM \$2**



DETROIT

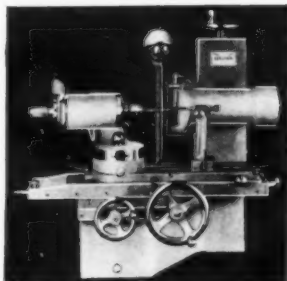
UTILITY GRINDERS

that accurately and quickly grind

1. Spiral End-mills.
2. Small Cutters.
3. Reamers—straight and tapered.
4. Taps—both lands and flutes.
5. Formed Tools.

Some Features Worth Noting

1. Ball bearing work spindle.
2. Work held by shank or on centers.
3. Quick set up—no wrenches.



Type TRS-1

Bergram Mechanical Engineering Co., Inc.

"Specialists in Grinding Machinery"

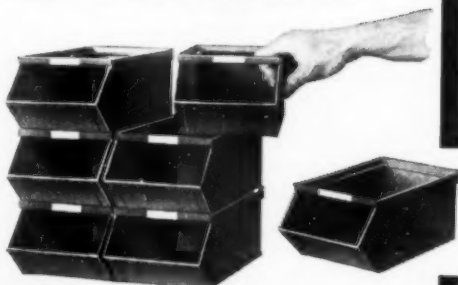
18 Hartford Ave.,

New Britain, Conn.

SPEED UP HANDLING

— *with* **STACKBINS**

Individual STACKBINS keep parts within easy reach — cut waste hand motions — speed up any parts handling job. Full width hopper fronts and perfectly smooth interiors make removal of parts swift and simple. Patented construction lets STACKBINS take roughest handling without damage.



STACKBINS

"STACKED AND STILL ACCESSIBLE"

STACKBINS save time — space — labor. They're durable and inexpensive. Write to Stackbin Corp., 55 Troy St., Providence, R. I.

Shop Kinks

A Tip For Automatics

By Lester Detterbeck, Tool Designer

In setting a roller bearing box tool, the following method has been found most successful:

Back the rollers up in the holder sufficiently far so they will not touch the turned body. Then after grinding the cutter as shown on the following sketch, set the cutter to turn the body slightly smaller than the box tool body is to finish. This difference between the size of the setting of the cutter and the finished turned body at this time should be approximately .002" on a $\frac{1}{8}$ " body and should gradually increase to .006" or .007" on a $\frac{3}{8}$ " body. A cut is then taken with the box tool for a length of approximately $\frac{1}{4}$ ". The spindle is next stopped with the box tool in position. The rests are then brought up to just touch the work. The bit is then moved back the distance to turn the correct sized body. It is absolutely essential that the cutter be set tangent to the turned body when making the cut.

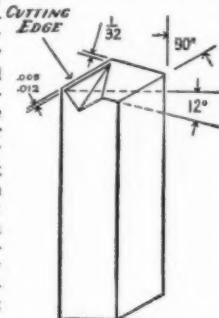
If in turning the box tool body, there is a slight taper so that it is large at the start of the cut and smaller at the finish of the cut, the blade is not set tangent, but instead is set back of the center of the stock. The opposite condition of this occurs when the blade is set ahead of the center of the stock.

When a bump occurs at the beginning of the cut, or there is an appearance as though the box tooled body has

been turned at the start of the cut to show a burr rolled out into the corner break, chances are that the cutter has been set to turn the diameter larger than necessary and the rolls have been used to bring it to size.

Many shops prefer to run the rests of a roller bearing box tool, when turning round stock, on the outside of the bar and not on the turned body. One salient feature of this is the ease of setting the tool. In this case the stock is fed out, then the rollers are brought to bear on the stock and a few thousandths pressure is applied by each roller to eliminate any possible runout due to slightly bent stock or runout of the collet. The cutter is next adjusted to cut the correct size.

Running the rests on the outside of the stock has one other distinct advantage especially where the turned body is to be threaded. The rests of a box tool burnish the body on which they run. This burnishing effect has a tendency to work harden the surface. This work hardening will often cause trouble on the chasers of the die and prevent a good clean thread.

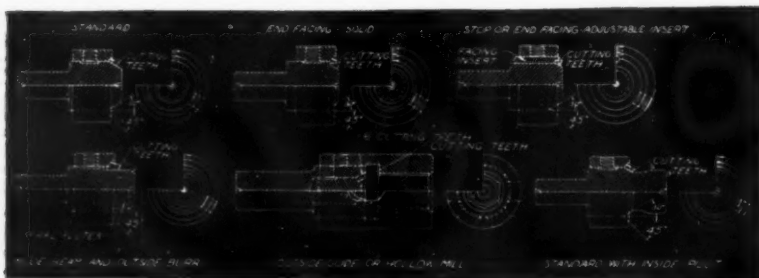


Burring, Reaming or Facing Tubing

Some ingenious cutters for burring, reaming or facing tubings are offered by Severance Tool Mfg. Co., 1510 E. Genesee Ave., Saginaw, Mich., several of which are shown in the accompanying drawings.

Performing inside and outside operations simultaneously the cutters are obviously time-savers.

In the manufacture, the cutters are first hardened and drawn to 63-65 Rockwell "C" and then ground from the solid. As a result the chips are cut sharp and clean—the tools give many hours of efficient service and withstand regrinding many times over.



If you have any special problem along this line the makers offer to cooperate in developing special cutters for your exact requirements.

Octo-Decimal Equivalents

The familiar micrometer conversion tables carry 48 errors and only 16 correct equivalents, according to E. F. Gibbs, Manager of Rigid Tool Holder Co., Detroit. In permitting us to reproduce his copyrighted table, he explains that the trouble began by dividing the original unit according to the Binary system. That is by halving the unit, and each successive fraction according to requirement, while the micrometer was graduated according to the Decimal system.

The table combines the two systems and produces a table of but four columns (three for Decimals and one for Octants) and 64 correct equivalents.

Take for example $41/64 = .6405$. The 5 only falls in the Octant column and it is 5 Octants or $\frac{5}{8}$ of one thousandth or 625 millionths, while Johansson now works to an accuracy of 2 millionths.

Hammond Automatic Composition Applicator

A circular describing the New Hammond "Auto - Doper" which applies composition automatically to buffing wheels is now available. It will be of particular interest to plants using polishing lathes, semi-automatic and full automatic equipment. Write Hammond Machinery Builders, Inc., 1614 Douglas Ave., Kalamazoo, Michigan.

OCTO-DECIMAL EQUIVALENTS

(Only correct abbreviations possible)

Copyright 1939 by E. F. Gibbs

8	16	32	64			64	32	16	8
			1	.015%	.515%	33			
			1	.031 ²	.531 ²		17		
			3	.046 ⁷	.546 ⁷	35			
			1	.062 ⁴	.562 ⁴			9	
			5	.078 ¹	.578 ¹	37			
			3	.093 ⁶	.593 ⁶		19		
			7	.109 ³	.609 ³	39			$\frac{5}{8}$
$\frac{1}{8}$			9	.125	.625		41		
			5	.140 ⁵	.640 ⁵		21		
			11	.156 ²	.656 ²				
			3	.171 ⁷	.671 ⁷	43		11	
			13	.187 ⁴	.687 ⁴				
			7	.203 ¹	.703 ¹	45			
			15	.218 ⁶	.718 ⁶		23		
$\frac{1}{4}$			17	.234 ³	.734 ³	47			$\frac{3}{4}$
			9	.250	.750				
			17	.265 ⁵	.765 ⁵	49			
			19	.281 ²	.781 ²		25		
			5	.296 ⁷	.796 ⁷	51			
			11	.312 ⁴	.812 ⁴		13		
			21	.328 ¹	.828 ¹	53			
			23	.343 ⁶	.843 ⁶		27		
$\frac{3}{8}$			13	.359 ³	.859 ³	55			$\frac{7}{8}$
			25	.375	.875				
			27	.390 ⁵	.890 ⁵	57			
			7	.406 ²	.906 ²		29		
			15	.421 ⁷	.921 ⁷	59			
			29	.437 ⁴	.937 ⁴		15		
			31	.453 ¹	.953 ¹	61			
$\frac{1}{2}$			1	.468 ⁶	.968 ⁶		31		
			1	.484 ³	.984 ³	63			
			1	.500	1.				1

The Micrometer Table Carries 48 Errors,
And Only 16 Correct Equivalents.

Detecting Flaws by X-Ray

The latest weapon in the campaign against flaws in industrial products, a 220-kv portable X-ray flaw detector, recently was placed in service in examining structural welds and heavy castings on production lines at the East Pittsburgh works of the Westinghouse Electric & Manufacturing Co.

The technique of radiographic diagnosis of large steel parts is expected

to be much simplified by this 4500-pound portable X-ray camera, since it may be wheeled along production lines to check the quality of machine parts during their manufacture.

Shockproof, completely self-contained, ready for work wherever there is a proper power supply, it is said to generate X-rays with a penetrating quality sufficient for them to pass through three inches of solid steel.

The focusing mechanism on the new equipment is extremely flexible, so that the apparatus may be aimed at a weld or casting in either a horizontal or vertical position.

X-ray tube, transformer, capacitors, and flexible focusing device are all compactly mounted on a chassis with four balloon tires, automobile springs, and two-wheel mechanical brakes, enabling two men to move the apparatus in safety.

Another new process recently developed by Westinghouse is heating by high frequency induction.

The demonstration apparatus is simply a high frequency oscillator with an induction coil. This apparatus is about 4 inches long and three inches in diameter.



Engineering data furnished on request.

GITS BROS. MFG. CO.

1860 South Kilbourn Ave.

Chicago, Ill.

MODERNIZE ECONOMICALLY**WITH A
SIMPLEX MACHINE
DRIVE****Easy to Operate
"STEELPOST"**

is plumbed to approximate center of cone pulley allowing head adjustment in a range of one inch.

Cone Pulley Shaft

is made to fit bore of your present cone pulley. This shaft is mounted in two special sealed bearings which will hold their lubricant for many years.

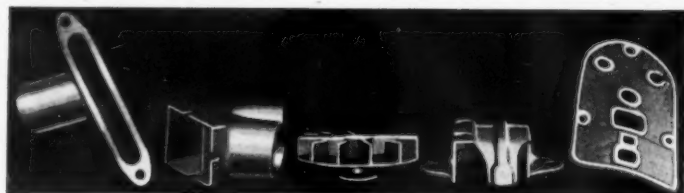
Belt Tightener

is self-contained, and has a wide range of adjustment.

**Built To Last
Fully Guaranteed \$30****For Use
Up to
18"
Laths****WRITE TODAY FOR BULLETIN****F. HAWKINS CO.**
DOWNERS GROVE, ILL.**Two Landis Bulletins**

The Landis Machine Co., of Waynesboro, Pa., offer two new bulletins. One is a direct mail folder which will be published bi-monthly, describing the various machines in the Landis line.

The other bulletin gives complete information on Landis hardened and ground die heads. It is a twelve page catalog listing advantages, uses, and specifications of the Lanco head, the landmatic head, and the Landex head.

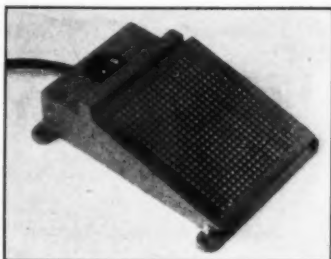
Hope you'll mention **The BLUE BOOK** in writing.**Centerless Grinding
(CONTRACT WORK)****Precision, Accuracy, Promptness***Let us quote on your specifications.***THE HEIM COMPANY**
Fairfield, Connecticut**Congress — for Die Castings**

Any quantity . . . any type of High Grade Die Castings . . . that's our specialty . . . and our new and modern equipment is always at your service for rapid, low cost production. We invite you to consult our Engineering Department for information or assistance on your Die Casting problems.

*Write TODAY . . . and send blueprints or parts for estimates.***The Congress Tool & Die Co., Inc.**
9042 Lumpkin Avenue, Detroit, Mich.

Leeds Foot Control

A new foot control switch for unit powered tools is announced by the Leeds Electric & Mfg. Co. The switch leaves both of the operator's hands free to handle work properly at all times. The



foot plate is large enough to be located easily without taking eyes from work. The angle of operator's foot is said to be natural and untiring.

The power tool motor runs as long as foot is on the control. To inspect work, when through with an operation, or in case of trouble, the simple and quick removal of foot automatically stops motor.

The switch is D. P. S. T. rated—12 amps at 125 volts and 6 amps at 250 volts.

Further information may be had from the manufacturer:—The Leeds Electric & Mfg. Co., 1840 Broad St., Hartford, Conn. Mention of The BLUE BOOK will be appreciated.

Write for
details



Cast

**YOUR Hammers
with the FIELD
MOULD and LADLE**

Low cost, simple operation.

JOHNSON TOOL CO., Inc.

65 Massasoit Ave., EAST PROVIDENCE, R. I.

BALCRANK

Precision
MACHINE



- ① MACHINED FROM SOLID BAR STEEL.
- ② SUPER SMOOTH POLISHED FINISH.
- ③ CLOSE TOLERANCE—ACCURATE BALANCE.
- ④ PRICED BELOW YOUR PRESENT COST.
- ⑤ COMPLETE STOCK ALWAYS AVAILABLE.
- ⑥ WRITE FOR CATALOG AND PRICES.

THE CINCINNATI BALL CRANK CO.
CINCINNATI, OHIO U.S.A.

LET US QUOTE...



Our new modern plant is fully equipped with special machinery for

**COMMERCIAL JIG BORING,
DESIGNING AND BUILDING
of
DIES, JIGS AND FIXTURES
LARGE OR SMALL**

We can handle your Jig Boring jobs at reasonable prices on our new 18"x36" Pratt & Whitney Jig Borer. Quick service.

Have been delivering satisfaction since 1929—let us serve you.

QUALITY TOOL & DIE CO.

Ray W. Rice, Manager,
401 N. Noble St., Indianapolis, Ind.



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Machined Steel **DIE SETS** Semi-Steel

Drop Forged Steel

Headquarters for Standardized Die Sets, embodying many exclusive features and embracing more than 185,000 stock sizes and 46 different styles. A die service that is unsurpassed. Let us prove it!

Write for our new 288 Page Catalog.

E. A. BAUMBACH MFG. CO.
1810 So. Kilbourne Ave., CHICAGO, ILL.

Standard Since 1911



**INCLINABLE
POWER
PRESSES**

**LOSHBOUGH-JORDAN
TOOL & MACHINE CO.**
1625 STERLING AVE ELKHART, INDIANA

Noggle Offers "Spin-A-Bin"

Go out into the shop and search through four tobacco tins of odds and ends for seven flat head screws No. 5, 1/4 in. Going through the boxes twice may locate what you want. Maybe a better way would be to have all screws, bolts, contact points, fuses and other small parts neatly stored in a "Spin-A-Bin," with a ticket on the front of each compartment (or a specimen wired to the front).

This revolving assembly of welded steel bins, all in one compact unit is a time saver in the shop, a merchandise mover in the sales counter. Made by Noggle Products Co., Ann Arbor,



Mich., it is available in a unit containing 24 bins each 3 x 3 x 2 1/2 in., or 24 bins each 4 x 4 x 3 in. In either model, a double width bin can be substituted for any pair of single width bins. Bins are 26 ga. steel, spot welded and finished in green.

Please mention this publication when writing.



CLOSED
TRADE



AUTOM

CLOSED
MARK



PLAIN Type

Offset Type

CONTINUOUS HINGES

All hinges shown can be furnished with special holes, cutouts and bends to blue-print in metals to suit the job.

THREE-FOURTHS OFFSET



**AUTO MOULDING
& MFG. CO.**

2326 S. CANAL ST
CHICAGO

SPECIFICATIONS:
Open Width $\frac{1}{8}$ " to 6"
Gage Material .040 to .125
Pin Diameter .101 to $\frac{1}{8}$
Lengths to 120"



SEMI-OFFSET

DeVilbiss Hose Catalog

An illustrated catalog containing full information on their complete line of hose for all requirements has been announced by DeVilbiss.

This new literature traces the product from the baled crude rubber through the DeVilbiss hose factory and testing laboratory to its various finished forms. These include spray-painting, air and fluid hose, service station air, water, gasoline and brake hose with solvent-resisting liner, welding and pneumatic tool hose and other special types designed and manufactured to meet the special demands of exacting jobs. The complete line of hose connections, valves, couplings and adapters manufactured by the company is also included.

Full specifications are listed with each type of hose illustrated, as well as much valuable information to aid in the selection of the right hose for the right job.

Copies of the new catalog may be obtained by writing The DeVilbiss Co., Toledo, Ohio. We will appreciate your mention of The BLUE BOOK.

A-C Type Crucible Weld Electrode

A-c crucible weld electrodes for every requirement are described in a new booklet by the Westinghouse.

Included are electrodes:—in three grades for low or medium carbon steel welding, brown, black and sheetweld; in two grades for cast iron welding, casting weld and free machine weld; in two grades for stainless steel; in five grades for hard surfacing; and for manganese steel.

Copies of this booklet, 26-650, may be obtained from headquarters of the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., and we'll appreciate mention of The BLUE BOOK.

Wire-Working Machinery Wire Mill Equipment

Sleeper & Hartley, Inc.
Designers and Builders
Worcester, Massachusetts

U. S. Vertical Syncrogear Motors

A new U. S. Vertical Syncrogear Unit Type G D V, complete with flange base is announced.

It has been especially designed by the U. S. Electrical Motors Engineering Staff to meet the conditions peculiar to vertical operation. It incorporates a small geared oil pump which forces an ample oil supply to bearings, gears, and pinions.

The unit is easily mounted. It presents a compact and well-balanced



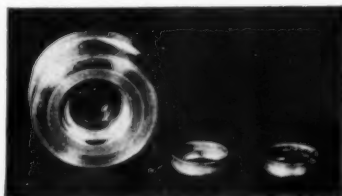
design, with a pleasing, streamlined appearance.

Further details may be secured by writing either to the Pacific Plant of U. S. Electrical Motors, Inc. located at 200 E. Slauson Ave., Los Angeles, Calif.,—or to the Atlantic Plant at 80-34th St., Brooklyn, N. Y.

McKenna Die Inserts

A new hard carbide insert for dies used in stamping and drawing is announced by McKenna Metals Co., 135 Lloyd Ave., Latrobe, Pa. Recent tests conducted by a large caster manufacturer indicate that dies faced with the new material known as Kennametal, will outlast ordinary tool steel dies many times.

In regular production runs Kennametal-faced dies stamped out 70,000 chair casters before the first regrind, as compared with a total life of 14,000 pieces for the best tool steel die they had been using. While this represents an increase of 500 percent in the number of pieces turned out, Kennametal faced dies actually have an even greater advantage, for they may be reground several times before being discarded. The die in the illustration has stamped out 11,000 casters without any visible sign of wear.



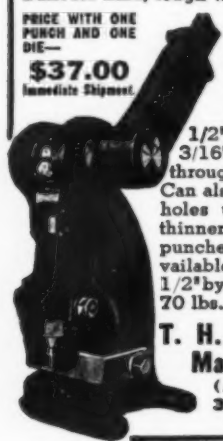
The basic ingredient of Kennametal alloys is an intermetallic compound of tungsten-titanium carbide, corresponding to the formula $WTiC_2$. Kennametal is generally used for machine tool tips, because of its ability to machine steel heat-treated up to 500 Brinell while combining roughing and finishing in one operation, as well as its adaptability to the machining of softer metals.

T. H. L. FRONT LEVER BENCH PUNCH

Built for hard, tough work — die can-

not lose alignment with punch — all parts interchangeable.

PRICE WITH ONE PUNCH AND ONE DIE—
\$37.00
Immediate Shipment.



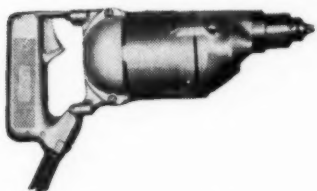
Capacity —
1/2" holes through
3/16" steel; 13/32"
through 1/4" steel.
Can also be made for
holes up to 7/8" in
thinner metal. Stock
punches and dies available from 1/16 to 1/2" by 64ths. Weight, 70 lbs.

**T. H. Lewthwaite
Machine Co.**

(Est. 1890)
311 E. 47th St.,
NEW YORK

Van Dorn Utility Drill

The Van Dorn Electric Tool Co., Towson, Md. announces as an addition to its line, a new $\frac{1}{16}$ " Utility Ball Bearing Drill. This tool has a no-load

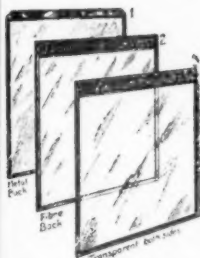


speed of 1100 r.p.m. which is correct for use with carbon bits and for general "utility" work. The capacity is given as $\frac{5}{16}$ " in steel and $\frac{5}{8}$ " in hard-wood.

A deep-grooved ball-bearing on chuck spindle with inner and outer races locked in place is said to absorb thrust in all directions. A splined gear mounting on spindle increases strength and reduces noise and wear; and removable commutator covers allow for easy brush inspection. In addition the $\frac{5}{16}$ " Utility has the additional chuck capacity which is so often desired in connection with maintenance and repair work in industrial plants and for repair work in garages and service stations.

In writing for additional information please mention this publication.

Protect Shop Orders, Drawings, Blueprints...



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Any size or style to order, stiff or flexible, to suit your requirements.

Send for folder and quotation.

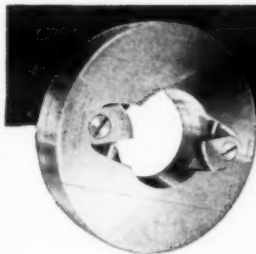
WADE INSTRUMENT CO.
1663-H E. 118th St., Cleveland, O.

CARROLL Universal Dividing Heads

20 Years of Popularity. 6", 10 $\frac{1}{2}$ "
12" Swing, Right or Left Hand
Type.



WM. CARROLL & SON
1776 Lexington Ave.. (Norwood) Cincinnati, Ohio



for
your
lathes

SENECA FALLS Automatic WORK DRIVER

Self Centering... Quick Acting... No Slip. Attaches to any chuck plate or spindle. Provides a slip-proof, balanced drive reducing chatter. Handles rough forgings or turned pieces—straight or taper. Eliminates dogging time. Reduces tool breakage. Write for details and size range.

SENECA FALLS MACHINE CO., 314 Falls St., Seneca Falls, N. Y.

Blank & Buxton Improve Index "39"

An innovation in the No. 39 Index consists of a mechanical device for controlling the swivel of the head. A worm and worm gear are enclosed in a bracket at the top and rear of the column joined to a shaft through the column and pinned to the head. This simplifies the operation of setting the head to any angle required, and also

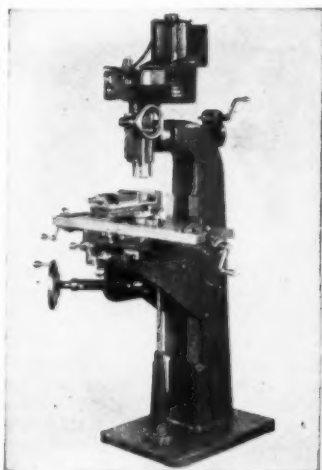
acts as a safety device, preventing the head from falling over in case the operator should let go of it whenever the clamping nuts have been loosened. This together with the movable quill



Universal Die Cushions for deep drawing, forming die, pressure pad control, and blanking die stripper actions.

Write for engineering power press die booklet.

Dayton Rogers Mfg. Co.
Minneapolis, Minn.



arrangement makes the No. 39 machine superior to No. 38. Movement to the spindle is obtained through screw and nut, which is an improvement over the use of rack and pinion for such movement.

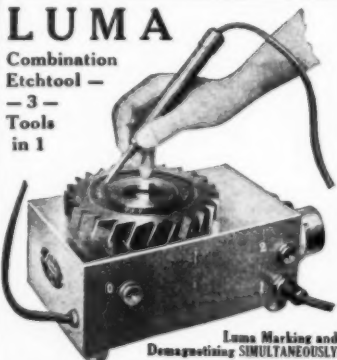
The spindle can be set at any height and even though the operator may forget to lock the spindle, which very often occurs, the spindle will not jar down out of position. To supply a movable quill in the milling head it was necessary to install a larger housing. This in itself provides greater rigidity than was obtained with the No. 38 milling head.

With the new design the makers say that No. 39 will take cuts with standard $\frac{1}{4}$ " end mills the full depth of the flutes across solid pieces of steel; in fact they claim to do the same with any end mill up to $\frac{5}{8}$ ".

Another demonstration has been climb cutting with $\frac{1}{4}$ " end mills; taking cuts anywhere from $1/32$ " to the

LUMA

Combination
Etchtool —
— 3 —
Tools
in 1



**Luma Marking and
Demagnetizing SIMULTANEOUSLY**

Writes on hardened steel — demagnetizes at the same time — with carbon point does light spot annealing and soldering jobs. Compact — easy to use — dependable.

Send for details — 5-day FREE TRIAL OFFER!

Luma Electric Equipment Co.
Dept. H—Main P. O. Box 132, Toledo, Ohio

STOW FLEXIBLE SHAFT EQUIPMENT



There's a Stow Flexible Shaft Machine for your job. Interchangeable tools quickly adapted to inside work, close corners, heavy grinding, sanding, wire-brushing and polishing. Units shifted easily anywhere in the plant. 10 Mountings high or low speed, $\frac{1}{2}$ to 10 H. P.

SEND FOR CATALOGUE 38

STOW

Inventors of Flexible Shafts 1875

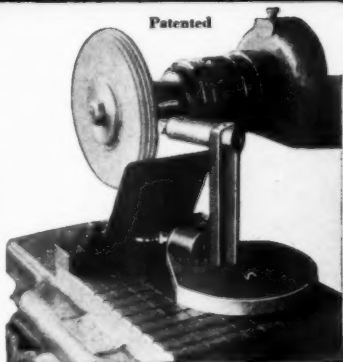
STOW MFG. CO., Inc.
30 Shear St., Binghamton, N. Y.

Reduce Hours to Minutes . . .

Time is just one of the important savings with the "B-K" Wheel Contour Dresser. You avoid the bother of complicated set-ups and exacting measurements. No special skill or attention is required to dress wheels exactly in accordance with templates. You can grind form cutters profitably from the solid. Duplication of ground parts is absolutely assured. There are no loose parts—no tedious adjustments. Adapted to any grinder carrying an 8-inch or smaller wheel.

Let us tell you all about it.

BRICKNER-KROPF MCH. CO.



Descriptive circular and price on request.

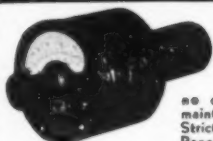
MUSKEGON HEIGHTS, MICH.

full diameter of the cutter. This, in the past, has been considered impossible.

The added feature of $3\frac{1}{4}$ " quill movement to the spindle is also valuable.

Please mention The BLUE BOOK in writing.

PYRO RADIATION PYROMETER

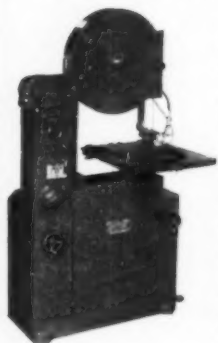


STOP spoilage. Get exact temperature of work in furnace. Direct reading; no calculations; no maintenance expense. Strictly automatic. Range 1000-3600° F.

Send for Illustrated bulletin No. 100.

THE PYROMETER INSTRUMENT CO.
102-105 Lafayette St., New York

TANNEWITZ DI-SAW



For inside and outside band sawing, filing, and polishing on dies, shoes, templets, and endless other jobs. A decided labor saver. A sturdy machine of ample capacity.

Send for literature.

The Tannewitz Works
GRAND RAPIDS, MICH.

Williams Torque "Measurrench"

J. H. Williams & Co., 225 Lafayette St., New York City, announces No. S-57 Torque "Measurrench" of the reversible ratchet type. Indicating right hand torque, the wrench may be used in two ways:

1. By Sight Reading — The calibrated scale shows applied pressures of 20 to 200 foot-pounds. It is read at point where index shoulder crosses the scale.
2. By Sound Reading — A sharp sound signal is given for any desired torque from 35 to 200 foot-pounds, by setting the simple sound device.

Accuracy does not depend on delicate gears, levers, or dials, but upon rugged sections of high tensile steel. Although right hand torque only is measured, the wrench action reverses for left hand turning. The 36-tooth ratchet wheel, with patented double-tooth pawl, makes possible the unusually short operating swing of only one-thirtieth ($1/30$) of a full turn. The wrench action is instantly reversed by a flip of the shifter, which is flush with the head.

The well balanced drop-forged handle, with specially designed grip, is $19\frac{1}{2}$ inches long for ample leverage; the head is exceptionally compact and free from protrusions, for easy use in close and hard-to-get-at places. Every part is made of alloy and high tensile steel, accurately machined and scientifically heat-treated. Finished in chrome-plate with entire top and sides of head and calibrated bar buffed; the handle is "satin" chrome.

Williams' Torque "Measurrench" No. S-57 is designed especially for use with Williams' Standard "Supersockets" but can be applied to any detachable socket having $\frac{1}{4}$ " square drive-opening. Full particulars may be obtained from the manufacturer, and we'll appreciate mention of The BLUE BOOK.

Lufkin Automatic Center Punch

Just added to the Lufkin line of machinists tools is No. 1671A, Automatic Center Punch with adjustable stroke.

A Punch of this type is valuable on fine work and handy for all marking. It assures accuracy and speed for with it, but one hand is employed, a hammer being entirely unnecessary. Thus it can be most precisely placed, and slipping and the many other chances of error in the hammer method are avoided.

This Center Punch has a simple mechanism, which, when tool is held upright on the work and downward pressure applied, automatically, at the will of the mechanic, strikes the blow. As necessary for dif-



ferent materials, the force of this blow is regulated by screwing the knurled cap. In this, No. 1671A offers a wide range of adjustment. Set for medium stroke, the length of this Punch is five inches. Its body is knurled and grooved to give positive grip. All working parts are properly hardened. Point is easily removed, ground and replaced, and extra points are also offered.

Please mention The BLUE BOOK in writing.

PERFORATING DIES



WALES individual, sub-press type units for press or press brake. Capacities up to $\frac{1}{2}$ dia. in 14 gauge — also square and Vee notching dies.

Write for Bulletin A

THE STRIPPIT CORPORATION
1559 Niagara St., Buffalo, N. Y.

ARTCO



Send for our catalog showing a great variety of shapes, sizes, types and cuts. There is an "ARTCO" tool for every job.

AMERICAN ROTARY TOOLS CO.

44 WHITEHALL ST.,

NEW YORK, N. Y.

"Stubby"—the Power Wheelbarrow

"Stubby" is the name of a new power utility fingerlift truck designed for general purpose service around manufacturing plants, machine shops, warehouses, etc. Its name is derived from a radically new and compact design.

The machine is only 38 in. wide, chin-high and lifts the bottom of the load to 60 in. The narrow width, the short wheelbarrow (38 in.) and the steering mechanism, which enables the truck to pivot on one wheel and make right angle turns, provides maximum maneuverability. The low center of gravity and the position of the driver, comfortably seated on top, provide extreme stability and enable the operator to see his pick-up clearly and spot his load accurately. The hydraulic, telescopic lift mechanism derives its power from an engine-driven pump.

The growing practice of assembling materials, parts and finished products in unit loads on skids or pallets has

created a demand for "Stubby," which gets hold of any load with as much as



2 in. underclearance, lifts it, carries it at from 1 to 7 mi. per hr. In most industries, skid equipment has been designed with 7", 12" and 18" underclearance, to accommodate standard types of platform lift trucks. No power platform truck will pick up more than one of these types of loads. "Stubby" picks up, carries and lifts all three, as well as innumerable loads that have been practically no underclearance at all. In addition, a rear coupling enables the equipment to be operated as a towing tractor. It is said to be cutting handling costs in storage and in production departments, as well as on car-loading operations. Made in several models, by Clark Tractor, Battle Creek, Mich., the machine is gas-powered for 24-hr. continuous service. Please mention this publication in writing.

Champion Portable Vise Stand



**FOR MILLS,
FACORIES,
TOOL ROOMS,
GARAGES,
MACHINE
SHOPS AND
GENERAL
INDUSTRIAL
PLANTS**

This sturdy portable vise-stand saves time and expense of unnecessary transfer of materials. May be readily moved to any section of plant. Wheel brakes assure positive action when desired—

Western Tool & Mfg. Co.
SPRINGFIELD OHIO

Sanding and Polishing Machines



Portable
Electric
Disc and
Oscillating
Types.

Send for circular

THE NEDCO CO.

87 Rumford Ave., Waltham, Mass.

NICHOLSON CONTROL VALVES

are made in two, three and four-way types for air, oil, water, steam, gas, etc., pressures to 5000 lbs. Style E is a general purpose valve for pressures to 300 lbs. Various metal combinations to suit any medium. Style J is for air and oil only, pressures to 125 lbs. Style H is a balanced hydraulic valve for pressures to 5000 lbs. We also manufacture foot, solenoid and motor-operated valves.



Style J



Style E



Style H

Bulletins on request.

OTHER NICHOLSON PRODUCTS: Mandrels, Arbor Presses, Flexible Couplings, Steel and Stainless Steel Floats, Steam Separators, Steam Traps, Air Separators, Air Traps, Air Vents, Etc.

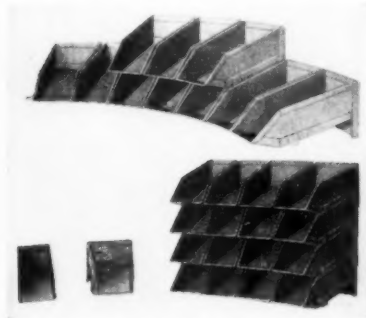
W. H. Nicholson & Company

117 OREGON STREET

WILKES-BARRE, PA.

Stackbin Assembly Bins

To fill a need for a uniform assembly bin which can be used on any assembly bench, Stackbin Corp., 48 Troy St., Providence, R. I., has designed a new bin which keeps parts always



within fingertip reach. Made with a sloping floor which feeds contents toward the front, the bins can be set up

in a semi-circle, and can be stacked one above the other to keep all parts within the most efficient reaching distance.

8 inches long, $2\frac{1}{2}$ inches deep, these new bins are 4 inches wide in back and 3 inches wide in front. Heavy gauge sheet steel and welded construction assure durability and long life. Patents have been applied for.

Errington General Price List

Production attachments by Errington are illustrated, described and priced in a new bulletin issued by Errington Mechanical Laboratory, 24 Norwood Ave., Stapleton, N. Y. Errington Auto-Reverse Tapping Chucks, Drill and Tap Chucks, Self-Opening Die Heads, Stud Setters, Nut and Screw Drivers, Quick Change Chucks, Fixed Center Multiple Drilling and Tapping Heads and Adjustable Spindle Drilling Heads are covered, including many novel additions that have been made to the line.

Portman Precision Geared Head Motors

A new line of precision-built geared head motors is offered by the Portman Machine Co., 2236A Bathgate Ave., New York, N. Y.

They were designed for industrial uses where a compact motor and spindle head in one unit assembly could be utilized to advantage as a direct power head drive in various applications.

— GEARS —

**Spur—Helical—Worm—
Bevel—Miter, Etc.**

We do broaching and all kinds of grinding.

We specialize in grinding hardened steel bushings, cam rollers, etc.

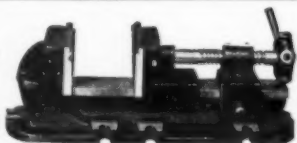
Prompt service and quality has retained a large list of customers for 25 years.

TAYLOR MACHINE CO.

1919 E. 61st St., Cleveland, Ohio

High
Grade

Low
Priced

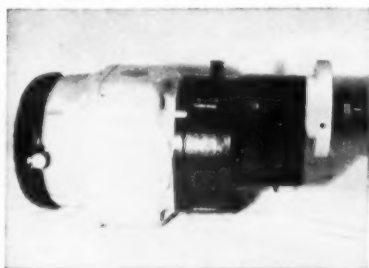


GEM VISES

3 SIZES

J. E. Martin Tool & Die Works, Springfield, O.

The built-in precision spindle unit of these motors is said to be an exclusive design featuring an off-set shaft of the parallel type in a gear housing of compact design, resulting in complete motor frame clearance for widest adaptability. The spindle is mounted on Fafnir duplex type preloaded bearings for maximum rigidity and precision performance under extremely heavy axial and thrust loads. In addition, the spindle is driven through over-size helical gears of wide face for quiet, positive operation. The spindle and gear housing incorporates integrally built-in seals said to completely protect the entire assembly against dirt, dust, abrasives, oil, acids, moisture and all foreign matter.



Motors are available in sizes from one to five h. p., for various current requirements, and with standard spindle speeds of 1150, 1725, 2300, 3450 and 5600 r.p.m. Spindle nose ends of



MODERNIZE present equipment with a RUSSELL BORING BAR. Bores 9/16" to 12" dia. with boring axis parallel to shank axis. One compact tool, with micrometer adjustment.

RUSSELL BORING BAR CO.
MIDDLETOWN, OHIO

THE DIAMONDS IN THIS WHEEL DRESSER CAN'T COME LOOSE!



**DIAMONDS HELD
PERMANENTLY IN
SPECIAL MATRIX**

The diamonds in CarboLOY Dressers can't come loose. They are actually "wetted" to a special matrix and permanently held in place. With CarboLOY Dressers you eliminate all remounting expense—and save at least 25% on dresser costs on all rough, semi-finish and finish dressing jobs. Send for Catalog DR-38.

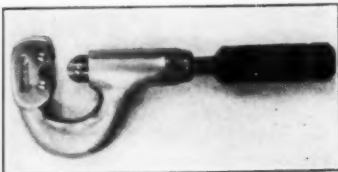
CARBOLOY CO., INC.

11120 E. 8 Mile Rd., Detroit, Mich.
Chicago • Cleveland • Newark
Philadelphia • Pittsburgh • Worcester

Catalog
DR-38

• CARBOLOY •

DIAMOND IMPREGNATED WHEEL DRESSERS



WADE Knurling Tool

For knurling long or slender work . . . easily and quickly, without any bother of adjusting it in the tool post. Knurl is fed into work by the screw on handle. Plunger carrying knurl is keyed so it cannot turn. Tool is 7" long. Maximum capacity is $\frac{3}{4}$ " diameter. Minimum capacity $\frac{3}{32}$ ".

Write for full details.

WADE TOOL CO.

WALTHAM, 1-1 MASS.
ALSO WADE BENCH LATHES AND
HAND KNURLING TOOLS

Completely
Cold Formed
Drawn to a fine
Chisel Blue
Double Heat
Treated

**BLUE
DEVILS**

SAFETY SOCKET SCREW CORPORATION
6405 N. KNOX AVE., CHICAGO, ILL.

KNOCK-OUT DRESSERS *will save you money*



Knock-Out Abrasive Wheel Dressers do as good job as a diamond but cost much less to use. No pressure is necessary as best results are obtained by just touching. Dressing a wheel requires just a few seconds.

Hardened adjustable bearings last indefinitely as they are constantly lubricated by oil wick. Send for bulletin E37H.

K. O. LEE & SON CO.
ABERDEEN, S. D.

KNOCK-OUT



**POWER DRIVEN
FORGE HAMMERS**

Formerly the Mayer-Moloch Hammer—made in 5 sizes, belt or direct motor drive—25 lb. to 500 lb. ram—extremely powerful, simple design. Write for details and prices on hammers or any repair parts.

D. J. MURRAY MFG. CO.
Wausau, Wis.
Established 1883

● ASK FOR THE GENUINE

**COMET
Vernier
Caliper**


\$5.50

with genuine leather pocket case.

WHY PAY MORE?

Send for one today!

Shop agents, dealers wanted.



Measures to .001" Outside, Inside and Depth

Measuring range 5-5/16"

Total length 8".

Scales: 1/16" with vernier 1/128", .025" with vernier 1/1000"

Decimal equivalents on reverse side of gage.

Glass-hard jaws.

Fine workmanship.
A precision tool at a reasonable price.

COMET TOOLS, Inc.
39 Union Square, New York, N.Y.

Grinding Wheel Dressers

We make all types of Dressers and Cutters



Write for Catalog "H"

DESMOND-STEPHAN MFG. CO.
URBANA, OHIO
The Canadian Desmond-Stephan Mfg. Co., Ltd.
Hamilton, Ontario, Canada

various types are available including standard shaft and keyway, threaded shaft ends with nuts and standard or special collars, Morse taper and chuck type spindle ends.

The new motors offer such advanced features as glass insulation for high temperature ratings and compact frame sizes for power ratings. Of the completely enclosed type of construction, they are externally fan cooled and are intended for use under all extremes of severe service and adverse application conditions.

Kaufman Takes On Gaterman Units

Leonard J. Kaufman, president of L. J. Kaufman Mfg. Co., Manitowoc, Wis., announces purchase of the Gaterman line of tapping machines from the W. Gaterman Mfg. Co., also of Manitowoc. In the future, these tapping machines will be manufactured in the Kaufman Mfg. Co. plant.



Several new features have been incorporated in the new Hi-duty Tapper, the principle of which is said to be covered by basic patents. The machine is said to operate on the same principle as hand tapping, only being far more sensitive, as the working strain is weighed to a fraction of an ounce. The manufacturer points out that there are no friction adjustments and that this prevents tap breakage.

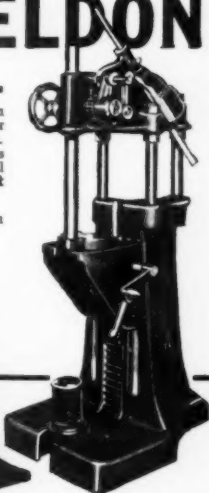
SHELDON

ARBOR PRESSES and VISES...

Sheldon ARBOR PRESSES come in 12 sizes, in capacities from $\frac{3}{4}$ to 10 tons, with Plain Levers, Hand Wheels, Ratchet Levers, or Compound leverage—with standard or special bases or platens. Each is a better press, with correctly engineered semi-steel frames that will not spring or spread and alloy steel racks and gears. All have round rams that simplify dies and jigs—round rams that hold their alignment—an exclusive SHELDON feature.

Sheldon Milling Machine, Drill Press and Shaper vises come in 5 types either plain or swivel base.

Write for Arbor Press Catalog
Lathe Catalog.



Sheldon Machine Co., Inc.
1629 N. Kilbourne Ave.,
Chicago, U. S. A.

Just a Few of The Hundreds of Money-Saving Uses for Breuer Ball Bearing TORNADO

INDUSTRIAL
VACUUM CLEANER

VACUUMS Tremendous power combined with light weight for portability and easy handling. Cleans walls, floors, shelves, overhead pipes, boiler tubes. Cleans castings, picks up water, reclaims valuable waste materials, cleans rugs or upholstery, truck interiors, removes metal scraps and filings. Use it from boiler-room to pent-house. Does most of the work large stationary machines will do at a fraction of the cost. Applicable for 98% of all plant cleaning requirements.

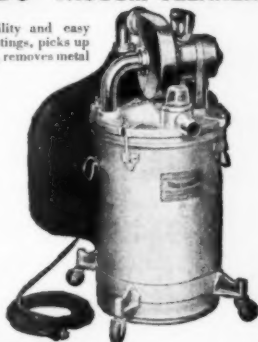
BLOWS Power unit can be quickly removed and with attachments converted into powerful hand blower for cleaning motors, machinery and parts, and hard-to-reach places.

SPRAYS Power unit also easily converted into sprayer for volume spraying of insecticides.

Three machines for the price of one! Hundreds of uses for each machine! No industrial plant can afford to be without this great time and labor-saver.

Write for free trial offer!

BREUER ELECTRIC MFG. CO.
5108 No. Ravenswood Avenue Chicago, Ill.



with BREUER'S BALL BEARING
TORNADO
PORTABLE INDUSTRIAL VACUUM CLEANER

FREE TRIAL!

We'll gladly send you a Tornado for free trial to prove our claims. No obligation. For prices and details of free trial offer, write.

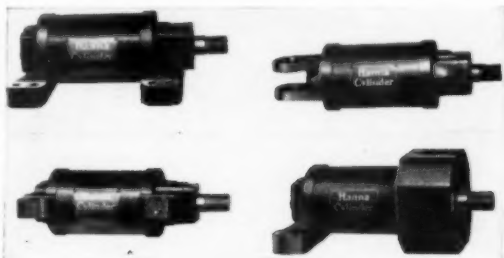
Hanna High Pressure Cylinders

Hanna Engineering Works, 1763 Elston Avenue, Chicago, Ill., announce a new line of high pressure cylinders. Designed for a maximum operating pressure of 1500 lbs., they are available in 10 distinct types of mounting with diameters ranging from 1½" to 8" inclusive.

Cylinders are of centrifugally cast high test iron. They are machined by the same method used in boring low range guns. A straight, concentric, mirror finish is obtained, accurate to size. Cylinder heads and pistons are also of high test cast iron. Heads and glands are secured by heat treated, alloy steel socket head cap screws.

Pistons are fitted with "Step Seal" rings. Piston rods are made of heat

treated alloy steel, turned, ground, and polished. "Differential" piston rods, the areas of which are one-half the



cylinder area, are optional features. Piston rods are "chevron" packed.

All Hanna high pressure cylinders are equipped with cushions in both heads. Cushions prevent harmful metallic impact in the cylinder and shock in its mounting. Their more important function is to prevent hydraulic shocks (water hammer) that "start joints," burst tubes, ruin gauges, and make pressure responsive controls do amazing things.

Ample air vent plugs are provided so that regardless of location of inlet ports there is always an air vent plug on the upper side of cylinder heads.

An outstanding feature, stressed by the maker, is found in the dimensions. The minimum in overall dimensions has been attained, a feature which will not only enhance appearance, but effect economies in the cost of making the application.

*Annis
Electric
Etcher*

Built for Continuous
Rough Service.

Quality Workmanship
Fully Guaranteed.

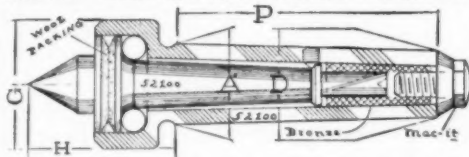
Write TODAY for Bulletin.

R. B. ANNIS CO., 1505-07 E. Michigan St.,
INDIANAPOLIS, IND.



Improved Stylus stays cool.
Makes working easier.

RIGID RESILIENT BULL CENTER

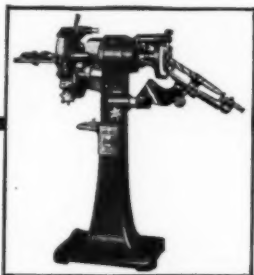


Rigid Tool Holder Co., 2,000 Witherell St.,
Detroit, Michigan

15

Not built down to a price, but up to an Ideal. More remarkable for what is left out, than for what it takes in. No Springs, but Axially & Radially Resilient. Largest Double-Dutied bearing balls, but smallest Head and shortest overhang. Heaviest duty, yet lightest runner. Races Integral and Immovable. Threadless housing, but thread-bound assembly within.

All Morse tapers carried
in stock.



**USE THIS
GRAND RAPIDS COMBINATION
TAP AND DRILL GRINDER**

AND YOUR TAPS AND DRILLS
WILL CUT FASTER
STAY SHARP LONGER
PRODUCE MORE AND BETTER WORK

BULLETIN ON REQUEST

GALLMEYER & LIVINGSTON CO.

405 Straight Ave., S. W.
GRAND RAPIDS, MICHIGAN

**No. 39 INDEX
High Speed Vertical Mill**

For jigs, dies, tools and patterns. Mills, drills and bores on straight or angle work. Uses $\frac{1}{32}$ to $\frac{1}{8}$ " end mills in tool steel. No. 9 B. & S. taper in ball bearing spindle with $3\frac{1}{4}$ " travel. Milling capacity $8 \times 16 \times 12$ ". Present users are making wonderful savings in their tool rooms.

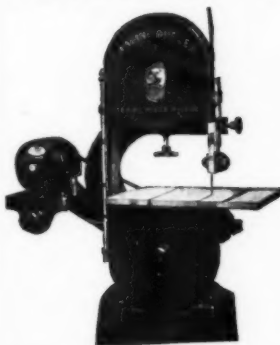
*Let us prove
it in your
plant.*



**Blank & Buxton
Machinery Co.**

Jackson, Mich.

RACINE Duplex Band Saw



Two Speeds—for cutting wood, steel, brass, copper, tubing, angles, templates.

The ideal all around machine for production shops, tool rooms, pattern shops, laboratories.

Accurate—Fast—Rugged. Modern, High Grade Construction.

"Standard the World Over"

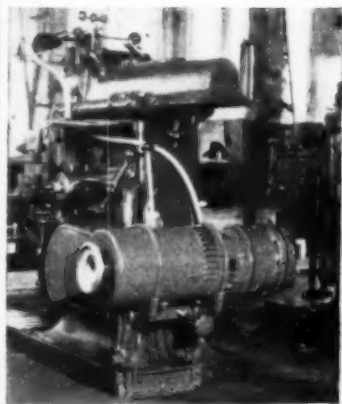
RACINE TOOL & MACHINE COMPANY

1754 STATE ST.

—:—

RACINE, WIS. U. S. A.

4 Speeds at Your Finger-Tip



Shaper operation is made more flexible—more efficient with a SCHULTES Four Speed Drive—with just the right speed for the job—at Your Finger-Tip.

The modern drives are equally valuable for lathes, milling machines, drills or punch presses. They're low in first cost and easily attached. Soon repay their cost through savings which they make possible.

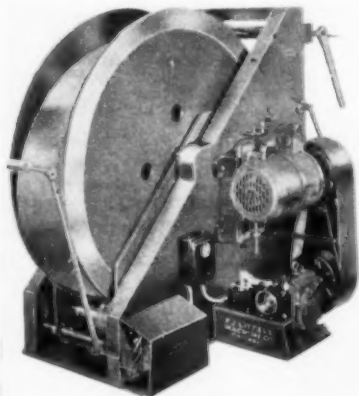
Schultes Drives incorporate all the latest engineering improvements and advantages. They're dependable, economical to operate and maintain, and will show definite savings in production costs.

*Write for bulletin
giving complete information.*

Westlof Tool & Die Co.
428 Bellevue Ave., Detroit

Littel Offers New Design of Coil Cradle Reel

A new departure in design is announced by the F. J. Littell Machine Co., 4153 Ravenswood Ave., Chicago, in its new type Coil Cradle Reel for handling coils that weigh up to 3000 lbs. and measure from 1" to 8" wide, although the width can be made to meet specific requirements. It is driven by a 2 h. p. motor thru a 3 to 1 variable speed drive and worm reducer.



To obviate excessive over-run when handling coils of considerable inertia, the Reel is equipped with a magnetic brake, which is applied when loop, formed during unwinding, trips a limit switch located at the rear end of the cradle.

For handling thin stock about .015" thick, the Reel is equipped with idling side-guide discs mounted on ball bearings to permit these to rotate with the coil and prevent curling of edges. For heavy stock up to 1/4" thick, the Cradle is equipped with hand straightener device for easy starting of the front end of coil into power-driven Straightener and Roll Feed.

The coil is supported by hob-knurled

collars mounted on two parallel shafts running in self-aligning roller bearings of high load carrying capacity. The frame is of one piece steel plate construction with welded steel base for maximum rigidity against sidethrust of coil.

To facilitate the loading of coils, the side-guide discs are adjustable to maximum separation by means of hand crank. When coil is in place, the discs are set closer to the stock for guiding.

With variable speed drive, speeds can be set so the motor runs constantly to rebuild loop at the rate at which it is consumed.

South Bend 9-Inch Workshop Lathes

Two new models have been added to the line of 9-inch workshop precision lathes manufactured by South Bend. These Models A and B, are in addition to the current Model C.

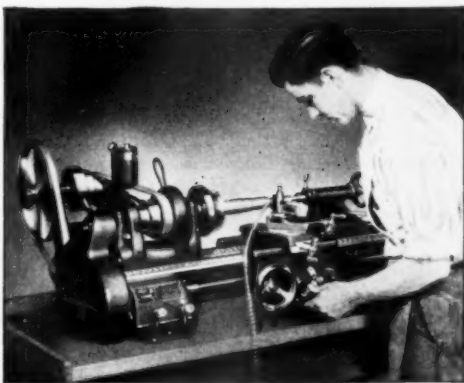
Model A is of the quick change gear type with automatic apron and friction clutch drive for operating the power cross feeds and power longitudinal feeds. Model B is of the standard change gear type with automatic apron and friction clutch drive for operating the power cross feeds and power longitudinal feeds. Model C has plain change gear equipment, power longitudinal carriage feeds through half-nut and lead screw, and hand-operated cross feeds. All three are identical except for apron and the change gear equipment.

The new quick change gear box developed for Model A provides 48 changes for cutting right and left hand screw threads 4 to 224 per inch, and 32 power longitudinal feeds ranging from .0014" to .0208" per revolution of the lathe spindle. All gears are of steel, precision machine cut. Metric thread cutting equipment can be supplied for those using the metric system.

All three models are available

in bench or floor types, with bed lengths in 3', 3½', 4', and 4½'. Several types of drive are offered, including horizontal motor drive for bench lathes; pedestal motor drive for floor type lathes; countershaft drive, V-belt horizontal motor drive and a 12-Speed horizontal motor drive.

Features of all three models include: —an Acme thread precision lead screw guaranteed to meet the most exacting requirements for cutting threads on master taps, precision gauges, etc.; heavily constructed lathe bed with 3 V-ways and one flat way hand-scraped to accurately align headstock, tailstock and carriage; an alloy steel headstock spindle with ¾" hole provides collet capacity up to 1½"; a back-gearred headstocks provides six spindle speeds, and spindle has a ball thrust bearing



for eliminating end play; a new improved capillary oiling system for spindle bearings; twin gear reverse for right and left hand threads and feeds. Hardened headstock spindle is also included as standard equipment on Models A and B and can be supplied as an extra on Model C.

A new catalog giving a complete description of the three models of Workshop Lathes has just been published. It is available by writing to the Technical Service Dept., South Bend Lathe Works, South Bend, Ind., and we hope you'll mention The BLUE BOOK.

END MILLS

Shear Cut



That's why
PROGRESSIVE
End Mills cut
faster and eas-
ier and leave the
smooth finish that
you want.

*Send for new cata-
log giving full in-
formation on the com-
plete line and prices.*

PROGRESSIVE TOOL & CUTTER CO.
2346 WOLCOTT ST. • FERRDALE, MICH.

Carboly Reduces Prices Masonry Drills

A price reduction ranging up to 31% on 14 standard sizes of Masonry Drills is announced by Carboly.

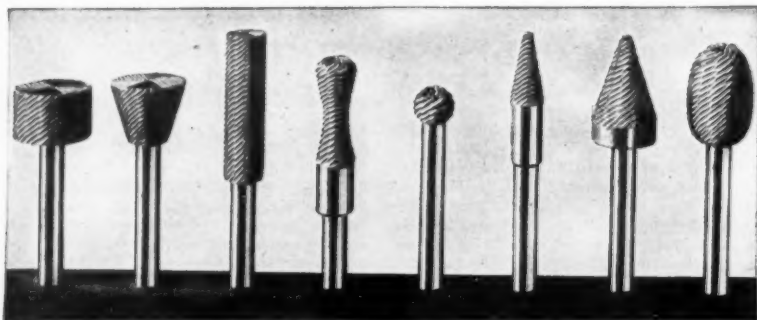
Carboly Masonry Drills are intended for use in the field of non-metallic drilling and are claimed to be of special value in drilling hard brick, concrete, porcelain, tile, slate, etc. It is stated that these drills increase the speed of hole penetration 50% to 75% over ordinary steel drills and maintain their sharpness up to 50 times longer than drills previously available. A further advantage said to result from their use is greater accuracy and elimination of ragged, splintered edges.

A new folder, number B-100, may be obtained upon request by addressing Carboly Co., Inc., P. O. Box 239, R. Pk. A., Detroit, Mich., and please mention The BLUE BOOK.

Ford Hand Cut



Rotary Files



Just a few of the many standard shapes which are carried in stock

Send for catalog and full information

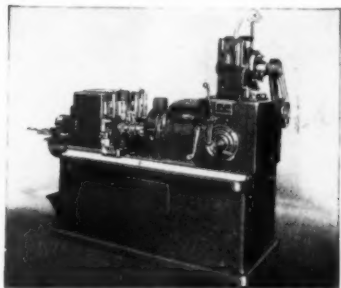
413
PERSHING AVE.,

M. A. FORD MFG. CO.

DAVENPORT,
IOWA

B. and S. Di-Matic

A complete description of the Two Spindle Billings Di-Matic bar stock automatic is released through a new bulletin describing models A and B. The Billings Di-Matic is a fully automatic machine, simple in design, rea-



sonably priced.

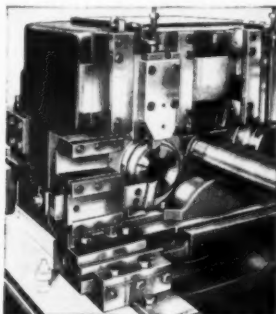
The bulletin emphasizes the speed and accuracy of the Di-Matic, a machine so easy to tool up and operate as to be economical even for short runs.

Incorporated in this bar stock Automatic are a number of novel features including non-indexing spindles, of standard design immovably set in a solid headstock; Cross Slide which carries a form tool for each spindle; independent cut-off slide allowing removal of cut-off tools from the side without disturbing the setup; cross slide cam—a single cam revolving between two rolls for smooth direct ac-

tion without backlash.

The Turret is a simple, cylindrical drum, carried in a massive housing that slides on the bed of the machine in hardened and ground steel ways. The main drive shaft has fitted over it, a torque tube which takes the place of the conventional cam-shaft and controls the feed mechanism.

For ordinary work, cams on the Di-Matic are universal. On special work they are accessible and easy to change.

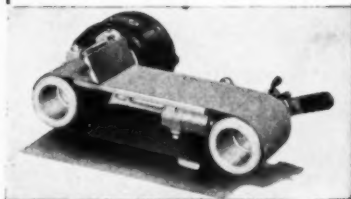


All operations are in full view of the operator at all times. The tools are easy to reach and set, reducing tool-up time to a minimum.

Further reduction in the number of parts composing the Di-Matic was obtained by enclosing all the main drive mechanism in a sealed gear box where it runs in a bath of oil.

The Billings and Spencer Co. have

AN INEXPENSIVE ABRASIVE BAND GRINDER



"Built Like A Machine Tool"

The Hornel-M Grinder is sturdily built with a supporting leg under the grinding table to eliminate vibration and tipping due to pressure on belt. Ball bearing throughout, equipped with Alemite lubrication, complete with grease gun.

Write for illustrated folder on this and other styles and sizes.

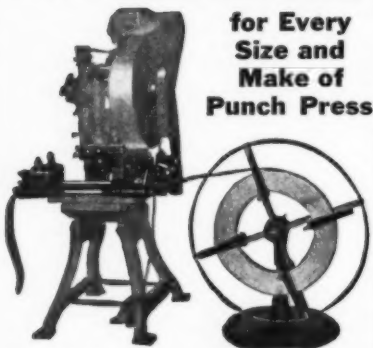
WALLS SALES CORP.

96 Warren St.,

New York, N. Y.

WITTEK

AUTOMATIC ROLL FEEDS



**for Every
Size and
Make of
Punch Press**

**FAST — ACCURATE !
SAFE — AUTOMATIC !**

WITTEK Roll Feeds will protect you and your operators. Presses are kept operating up to capacity—feeding any stock from coils in lengths up to 24" per press stroke—saving in time, dies and production costs. Single roll, double roll and compound types with straightener — fits any press without alterations.



WITTEK Reel Stands
— 6 models — enable
one man to center
heavy coils. Ball bearing
mounted—adjustable
to any height—
balanced at any angle
—500-lbs. capacity.

Send for Bulletin "HF"
giving complete details.

**A size for every
requirement.**

WITTEK MANUFACTURING CO.

4305-9 W. 24th Place, Chicago, Ill.

also introduced a new cut-off tool for used in tool rooms, tool cribs, stock bins, warehouses, etc., in fact any place where drill rod, wire, or the smaller diameters of bar stock must be cut.



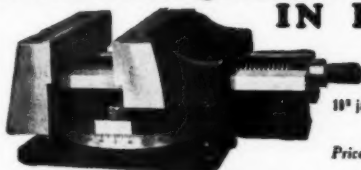
The manufacturer claims the tool will cleanly cut off drill rod and wire from 0 to $\frac{1}{4}$ " round inclusive without leaving a burr. The severed ends of the stock are not distorted and free for entry for additional cuts.

You may secure complete information on both Di-Matic and the cut-off tool by writing Billings & Spencer Company, Hartford, Conn. We'll appreciate your mention of The BLUE BOOK.

Stow Rotary Files

A supplement to the catalog No. 38 of Stow standard flexible shafts and equipment illustrates many of the different sizes and shapes of burs carried in stock for immediate delivery.

SUPERIOR QUALITY AND WORKMANSHIP IN PLUNKET VISES



The Shaper Vise has graduated base and tongue in center to fit slot in table, and has holes for bolting down. In ordering this vise give size of slots in Shaper Table, also distance from center to center of slots.

18" jaws, 2 1/4" deep, opens 11 1/2". Weight 125 lbs. **\$46.80**

Our complete line includes Vises for Drill Presses, Milling Machines, Shapers and Grinders.

Prices are net, f. o. b. Chicago. Write for illustrated folder today. Dealers wanted in unoccupied territory.

SQUARE BASE SHAPER VISE

J. E. Plunket Machine Co. 1133 W. Lake Street
Chicago Illinois

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Here's a Plug Gauge that gives you double your money's worth. The double life gauging members can be reversed when worn to give you 100% more service.

Super precision lapped to the brilliance of a diamond.

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A splendid hotel in an ideal location — with superior service, genuine hospitality and three restaurants featuring excellent cuisine . . . Visit the Alpine Tavern, the rendezvous of Cleveland.

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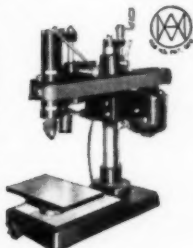
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Drilling small holes in the smallest wire gage sizes is no problem with Muehlmann Drilling Machines. They are used extensively for drilling Diesel Injector Nozzles, Instrument and Jewelry work. Users report 100% savings on drill breakage.

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THE HAMILTON TOOL COMPANY**

**Hamilton,
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● DON'T DISCARD IT

Effect a 30% to 75% saving in tool costs, by having your worn-out or obsolete tools made over by RENU — and guaranteed as good as new, both for appearance and performance.

Renu Tool Co.,
275 E. Milwaukee Ave.
DETROIT, MICHIGAN

Renu IT!



The illustrations are actual size and shape. All of these burs are of a specially developed high speed steel unless otherwise stated. The line includes many different types of mill cut and spiral cut burs including a number of special shapes for cleaning aluminum cylinder heads of aviation engines.

Address the Stow Mfg. Co., 30 Shear St. Binghamton, N Y., for a copy of the supplement—or one of the complete catalogs if you do not have one.

Geometric Taper Cutting Die Heads

The Geometric Tool Co., New Haven, Conn. offers a complete new line of Taper Cutting Die Heads for use on hand operated machines such as screw machines, turret lathes, etc. where a stationary die head can be employed.

The makers explain that it is possible to cut a taper thread with a standard die head by using the head on a jam cut basis (i. e., the taper built into the chasers). Such a method

MARSCHKE Heavy Duty Grinders and Buffers



A catalog showing seventy different grinder and buffer specifications will be sent promptly upon receipt of request.

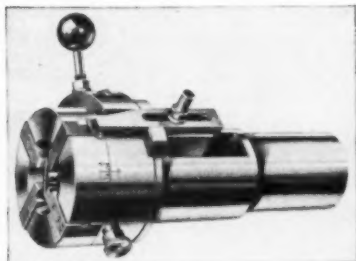
Considering only such major specifications as weight and sizes of motor, wheels, bearings, spindle diameters, you'll find a lot of other machines to compare with MARSCHKE ELECTRIC GRINDERS and BUFFERS.

But do not overlook the less spectacular and more important items of material specifications, workmanship and particularly the provisions for lubrication, bearing and motor protection, and above all the details of wheel guard construction.

Let us tell you about the details accounting for the superiority of MARSCHKE GRINDERS and BUFFERS.

Vonnegut Moulder Corp.
1805 Madison Ave., Indianapolis, Ind.

has numerous drawbacks: — difficult threading on tough materials since the further on the work you go, the more power required and the more strain on the chasers; the jam cut chasers frequently leave a discernible line on the work under the opening action.



Thus there is an obvious field for a Taper Cutting Die Head, particularly with today's demand for tougher materials and greater accuracy. The Style

CT Taper Die Head was the Geometric tool chosen to fill this demand after trying out several different designs in numerous plants over a period of the past several years.

Some of the outstanding advantages cited for the Geometric Style CT Taper Die Head are:

1. Better controlled accuracy—the resultant taper being controlled by a positive cam.
2. Less power is required—the chasers cut a taper thread just like a conventional die head cuts a straight thread—the chamfer and the first full tooth back of the chamfer doing all the work, whereas with the jam cut method all the teeth are cutting and cutting harder the further on you go.
3. Greater lengths of taper can be cut without the use of projection chasers. The length of taper is not limited to the height of the chaser as is the case with a jam cut.
4. No objectionable lines when the tool opens—just a smooth even thread

GREENERD

Arbor Presses

For assembling, broaching, piercing, keyway cutting, oil grooving, straightening, pressing, molding, and many similar production operations.

Sixty-five standard styles and sizes, manually operated presses from $\frac{1}{4}$ to 35 tons pressure. Motor driven Hydraulic Presses from $1\frac{1}{2}$ to 15 tons.

The Originators of the Arbor Press

Greenerd Arbor Press Company

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all the way.

5. Steeper tapers. On tough materials or any material for that matter you can cut a better thread with less danger of chaser breakage.

6. Better threads—smoother; more accurate—at a lower cost per thread.

The tools themselves are made out of special alloy steels, hardened and ground for accuracy and long life. Simplicity of design keeps down the selling price and at the same time makes it an easy matter to set up and operate these tools. Incidentally, these tools may be used either as Inside Trip Die Heads or as Outside Trip Die Heads—just as you prefer.

Nine stock sizes offer a threading range from $\frac{1}{4}$ " to 6" in large end diameters; $\frac{1}{8}$ " to 5" Pipe. Other sizes may be made up for larger sizes or for special applications.

Please address the makers for further details—and we hope you'll mention The BLUE BOOK.

Tool Storage Catalogue

A new catalogue completely illustrating and describing the construction and use of steel tool storage equipment is offered by Lyon Metal Products, Inc., Aurora, Illinois.

It pictures a wide variety of storage equipment and describes the use of each for different types and classes of small tools. Included also are methods of bar storage, shop equipment, enclosure panels, and tool and die storage.

The makers emphasize that this improved and modernized tool storage equipment assists in protecting valuable tools, provides visible, accessible storage, and saves labor and floor space.

In writing for copy of the catalog, we'll appreciate mention of The BLUE BOOK.



MAC-ITS Save on Production, Maintenance and Design!

Stronger, more accurate screws can end many tie-ups—save labor and replacements—and cut costs all along the line when your designs take advantage of their greater strength.

Mac-its give you all these savings in 16 standard items. For complete details, call your Mac-it distributor or write today for your copy of Catalog 38, listing the only complete line of heat-treated, alloy steel screws!

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1392 West Third St., Cleveland · Ohio

"...shaves over 300 gear types

**with only
14
cutters..."**



Using Michigan 860 type gear finishers, FULLER MFG. CO., producers of bus, truck and industrial transmissions, and special gearing, has found that with but 14 cutters it can shave every one of its more than 300 "active" gear types at a lower cost than for finish hobbing or shaper-cutting . . . while obtaining the greater quietness, greater accuracy, longer life, and faster production, which characterize MICHIGAN-shaved gears.

Combined set-up time for gear shaver and MICHIGAN gear checking equipment for each new run at Fuller, averages only 30 or 45 minutes, depending on whether or not cutters are changed.

Regardless of your production quantities, if you are interested in better gears at a lower cost, it will pay you to investigate MICHIGAN gear finishing equipment.

Bulletins available on Rack-Shavers (high production); 860 shavers (job lots); Checking equipment; lapping machines; Cone area-contact worm gearing; gear cutting tools.

MICHIGAN TOOL COMPANY, 7171 E. McNichols Rd., Detroit

Keller Portable Power Hack Saw

A useful and inexpensive power hack saw designed to meet the needs of smaller shops is offered by Sales Service & Mfg. Co., 3401 5th Ave., South, Minneapolis, Minn. Outstanding features of this new Keller portable power hack saw are two speeds, motor drive, automatic stop, and swivel vise.

The Keller saw can be used either as a bench or floor model. It has a capacity of 4 x 4 inches. The vise swivels to 45 degrees and the capacity at this angle is 3 inches. Automatic stop and electric switch are featured. Either hand or power blades can be used. The saws will accommodate ten inch blades. Two speeds are available by shifting belts on V-belt pulleys. The



SOCKET HEAD
CAP SCREWS



SAFETY HOLLOW
SET SCREWS

MADE OF ALLOY STEEL MILLED FROM BAR

*Try Them On Your Next Job!
Or Write For Samples Today.*

ECONOMY MACHINE PRODUCTS COMPANY

5207 Lawrence Ave., Chicago, Ill.

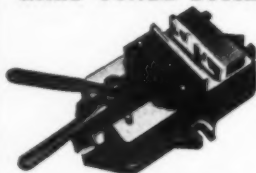


gravity feed with lift on reverse stroke relieves blade wear.

The saw is driven with a $\frac{1}{4}$ horsepower motor operating at 1750 r. p. m. Length of stroke is four inches, number of strokes, 70 and 125 per minute. The floor model weighs approximately 200 pounds, complete with motor; bench model, 125 pounds.

The base and frame of this popular priced Keller hack saw is made of steel. All joints are welded. The gears are of semi-steel and are precision cut to eliminate noise and for long life.

HARD USAGE Doesn't Faze The HARTFORD MILLING VISE



Because it was designed to "take it"—and it does! It will stand up, day after day, under the heaviest, toughest strain of production milling work. Made of the best materials, with all parts interchangeable, it will outlast four or five ordinary vices. Rapid and accurate in operation—the top eccentric handle gives tremendous binding force, while the lower cam-faceted handle gives instantaneous quick-opening and return. A trial in your shop will convince you better than anything we might say.

Write for Folder and Complete Details

Jaw width..... 5" Maximum opening. 3½"
Jaw depth..... 1½" Weight..... 40 lbs.

Also made in the swivel-jaw type with hard or soft jaws, maximum opening 2½".

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The saw frame can be raised or set to any position by locking bolt lever.

A stock rest which may be adjusted to fit the height of the floor or bench model is available. When writing for further information please mention **The BLUE BOOK**

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Used for indicating the presence of



mobile Ignition, etc. The glow tube lights up instantly in a changing static field—it is not necessary to touch the conductor, carrying the potential. Gives positive indication on 2,000 volts and up, in several times the flashover distance on non-insulated conductors.

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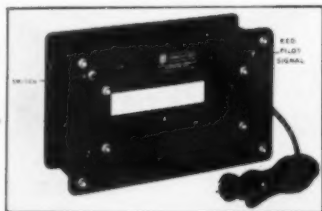


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The Postel Filing Mch. Co.
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Minneapolis, Minn.

AMC DEMAGNETIZER A TOOL ROOM NECESSITY



Every tool room needs this simple, portable, sturdy demagnetizer. Small parts passed through the powerful AMC field are instantly demagnetized. Large, flat surfaces can be demagnetized by sliding the device over the surface.

Price is only \$32.50, complete as shown.

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B-3**

**Throatless
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**A New Heavy
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Maximum shearing capacity—
3/16" mild U.S. steel or 10 gauge
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Nos. 1 and 2.

Reasonably priced—send for descriptive circular

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"HALLOWELL" SHOP EQUIPMENT

Its steel construction gives it greater strength and longer wear . . . yet it keeps its price at present day levels.



Fig. 732
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Pats. Pending.
Drawer is extra.

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Popular everywhere is this bench because of its rigid steel construction, a top that stays smooth as a surface plate and its really low price. Over 1300 combinations make certain your needs can be met. Catalog?

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"HALLOWELL" STEEL TOOL STANDS

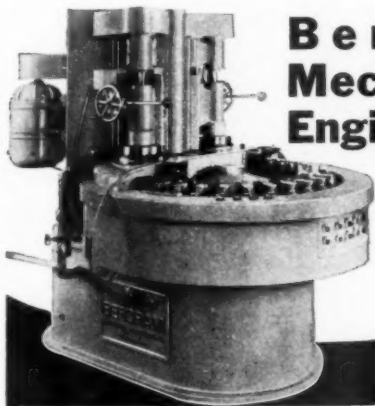
Moves easily wherever it's needed; a handy stand to have. Made in a variety of types for all purposes.



Fig. 705

Close tolerances—individual motors with variable stepless speed control on each spindle—automatic or manual vertical spindle feed—variable work table speed—maximum wheel life—low operating cost.

*These are
just a few
of the
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of the
Type SG-1
Surface
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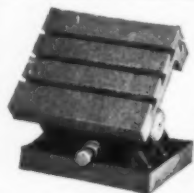
95 Allyn St., Hartford, Conn.

Modern Offers Quick-Change Boring Mill Set

The Modern Collet and Machine Co., Ecorse, Mich., have recently added a complete set of boring mill bars and adaptors to their established lines. Known as the Modern Quick-Change Boring Mill Set, the equipment is assembled in a sturdy box of a convenient size for use on a work bench next to the machine.

The makers assert that this set has been designed to improve boring mill operation in many ways. Once a boring bar has been set to bore a hole, it may be removed from the holder and replaced in exactly the same position, thereby assuring accurate diameters and depth of holes without exhaustive checking. It is claimed that end cutting, side cutting or shear cutting tools cannot work out, pull out, or in any way change position during cutting operations, making possible accurate milling and facing and avoidance of spoilage. Tool bit holes are at right angles to the bars so that spotfaced bosses are obtained with a straight tool without any concave or convex variations. This set will operate efficiently up to an eight-inch face mill, and still retain all the quick-change features. To the manufacturer's knowledge, this is the only boring mill set which offers all of these advantages.

All boring bars or adaptors in this set can be interchanged in the chuck in approximately five seconds. The tools are said to provide the rigidity necessary for the fine work. The main holder and all parts subject to axial



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Adjustable Angle
Plate

For grinding any
angle accurately.

Two sizes

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3 1/2 x 3 1/2 \$12.

Model "D" with tap hole

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At Last!**A Positive,
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Keyless
Drill Chuck...**

Check these advantages:

- 1—Drills will not slip.
- 2—100% keyless.
- 3—The heavier the load, the tighter it grips.
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- 5—Yes! The tapered shanks are tempered.
- 6—Slight twist of the wrist releases drill.
- 7—Scientifically designed, ruggedly constructed.
- 8—Runs true—and remains so.
- 9—Unconditional one-year guarantee (barring abuse)

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Motor Tool Mfg. Co.
12280 Turner Ave.,

Detroit, Mich.



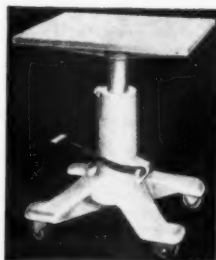
and/or radial strains are made of high grade alloy steels and tempered to withstand severe shock loads. This equipment is readily adaptable to either boring or milling machines.

Please mention **The BLUE BOOK** in writing for further details.

Pollard Improves Rack

The Pollard Bros. Mfg. Co., located at 5505 Northwest Highway, Chicago, Ill., manufacturers of factory equipment have redesigned their bar stock rack. It is so arranged that the extension arms are bolted to the upright channels and can be placed 3" apart. Seven arms are supplied with each rack which can be placed in any position desired. The racks are made in double arm or single arm styles. The single arm rack can be placed against the wall.

The base is a heavy casting, wider than any of the arms, supporting an upright channel. The base fits around this channel and is bolted to same. The channel is 65" high which makes it the right height so that a man can take a bar off the top.

**SAVE
Labor
and
Time**

Eliminate heavy lifting. Cut handling costs. Table

swivels and locks in any position. Can be varied 15½" by slight foot pressure, leaving operator's hands free. Engineered and built by tool engineers, experienced in production of special machines, dies, jigs and fixtures for exacting requirements.

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MIDWEST TOOL & ENG. CO.
112 Webster St., Dayton, Ohio

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and VALVES**

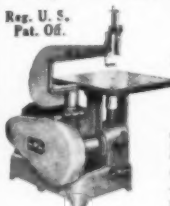
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The Bell Machine Co. 61 Jackson Dr. Oshkosh, Wis.

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Filing and Die Making Machine

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The "Butterfly" owes its ever increasing popularity to its high standard of efficiency. It is the quietest machine of its kind and is well adapted to highly accurate work. It is being used by the leading manufacturers of the United States and Europe and also by the United States Government.

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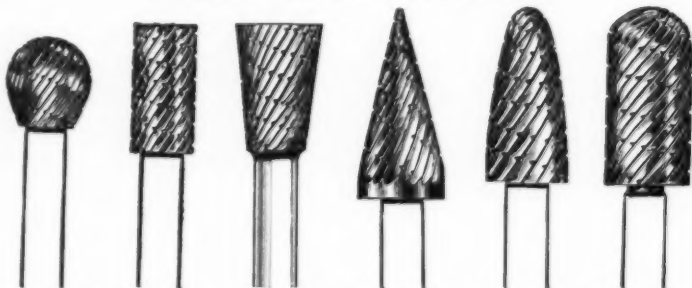
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| <input type="checkbox"/> Burnishing Machy. | <input type="checkbox"/> Diamond Tools | <input type="checkbox"/> Furnaces, heat treating, oil or gas | <input type="checkbox"/> Hammers, steam |
| <input type="checkbox"/> Bushings, brass | <input type="checkbox"/> Die casting machines | | <input type="checkbox"/> Hand Saws, p. elec. |
| <input type="checkbox"/> Bushings, bronze | <input type="checkbox"/> Die Sets | | <input type="checkbox"/> Hobbing Machines |
| <input type="checkbox"/> Bushings, hardened | <input type="checkbox"/> Die Sinking Machines | <input type="checkbox"/> Gages | <input type="checkbox"/> Hobs |
| <input type="checkbox"/> Bushings, jig | <input type="checkbox"/> Die Stocks | <input type="checkbox"/> Gage Blocks | <input type="checkbox"/> Hoists, chain |
| <input type="checkbox"/> Bushings, steel | <input type="checkbox"/> Die Cushion | <input type="checkbox"/> Gages, comparator | <input type="checkbox"/> Hones |
| | <input type="checkbox"/> Die Duplicating Machines | <input type="checkbox"/> Gages, dial | <input type="checkbox"/> Honing Mch., cyl. |
| <input type="checkbox"/> Cabinets, filing | <input type="checkbox"/> Die Filers | <input type="checkbox"/> Gages, plug, ring, snap | <input type="checkbox"/> Hose, rub. metallic |
| <input type="checkbox"/> Cabinets, tool | <input type="checkbox"/> Dies, blank, forming | <input type="checkbox"/> Gages, taper | <input type="checkbox"/> Hydraulic Machinery and Tools |
| <input type="checkbox"/> Case Hardening Furnaces | <input type="checkbox"/> Dies, hole punching | <input type="checkbox"/> Gages, thread | <input type="checkbox"/> Index Fixtures |
| <input type="checkbox"/> Castings | <input type="checkbox"/> Dies, thread rolling | <input type="checkbox"/> Gears | <input type="checkbox"/> Indicators |
| | <input type="checkbox"/> Dies | <input type="checkbox"/> Gear Blanks, non-met. | |
| | <input type="checkbox"/> Diving Heads | <input type="checkbox"/> Gear Cutting Machy. | <input type="checkbox"/> Jig Bore |
| | <input type="checkbox"/> Dowel pins, steel | <input type="checkbox"/> Gear Testing Machy. | <input type="checkbox"/> Jigs & Fixtures |
| | <input type="checkbox"/> Drafting Machines | <input type="checkbox"/> Gears, cut | |
| | <input type="checkbox"/> Drawing Instruments | | |
| | <input type="checkbox"/> Dressers | | |
| | <input type="checkbox"/> Drill Presses | | |

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☐ Lathes, polishing & buffing
☐ Lathes, precision
☐ Lathes, toolroom
☐ Lathes, turret
☐ Lathes, spinning
☐ Lathes, extension bed and gap
☐ Lathes, double end
☐ Layout fluid
☐ Layout plates
☐ Lift Jacks
☐ Live Lathe Centers
☐ Lock Form. Mch., pr.
☐ Lubricants
☐ Lubricating systems
☐ Mandrels, ex. & solid
☐ Magnetic chuck demagnetizers
☐ Marking machines
☐ Meters
☐ Micrometers
☐ Milling attachments
☐ Milling Machines
☐ Milling Mch., bench
☐ Milling Mch., duplex
☐ Milling Mch., hand
☐ Milling Machines, Lincoln type
☐ Milling Mch., pl. ty.
☐ Milling Mch., univ.
☐ Milling Mch., horiz.
☐ Milling Mch., plain
☐ Milling Mch., vert.
☐ Milling Mch., uprpt.
☐ Mold & Die Cop. M.
☐ Molded plastic prod.
☐ Molybdenum
☐ Motors
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☐ Motor drives, univ.
☐ Motor starters
☐ Name plates
☐ Nibbling Machines
☐ Nut setting equip.
☐ Nut tappers
☐ Oil cups
☐ Oil and grease seals
☐ Oil groovers
☐ Oils, cutting
☐ Oils, lubricating
☐ Oils, quench. & tem.
☐ Patterns
☐ Pillow Blocks
☐ Pins, leader & dowl.
☐ Pipe, cutting and threading mch.
☐ Plate Rolls
☐ Press Brakes
☐ Press Feeds
☐ Presses, arbor
☐ Presses, bench
☐ Presses, broaching
☐ Presses, foot
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☐ Presses, inclinable
☐ Presses, power
☐ Presses, punch
☐ Presses, screw
☐ Presses, percussion
☐ Presses, straighten.
☐ Profiling Machines
☐ Pumps
☐ Pumps, coolant, lubricant & oil
☐ Punching Machy.
☐ Punches & Dies
☐ Pyrometers
☐ Racks, gear, cut
☐ Racks, bar stock
☐ Radiators, Japanning-oven
☐ Reamer Holders
☐ Reamers
☐ Reamers, adjustable
☐ Reamers, taper pin hole
☐ Reaming machines
☐ Regulators, temp.
☐ Rivets
☐ Riveting Machines
☐ Rod Cutters
☐ Rope drives
☐ Rotary Converters
☐ Rotary Files
☐ Router Bits
☐ Sand Blast equip.
☐ Sanders
☐ Saws
☐ Saw Sharpening Mch.
☐ Sawing Machines, circular & frict.
☐ Screw Drivers
☐ Saws, cir. met. cut.
☐ Screw Cutting Tools
☐ Screws, cap, set, saf. set & machine
☐ Screw Drivers
☐ Screw Mch., auto.
☐ Screw Mch., hand
☐ Screws
☐ Scribes
☐ Separators, oil
☐ Shapers
☐ Shafts, flexible
☐ Shafts, hangers and boxes
☐ Shapers
☐ Shapers, vertical
☐ Shapers, structural
☐ Shears, bevel
☐ Shears, electric
☐ Shears, hand
☐ Shears, power
☐ Shears, slitting
☐ Shears, splitting
☐ Shears, throatless
☐ Shears, rotary
☐ Shears, squaring
☐ Sheave wheels
☐ Shelving, steel
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☐ Stampings
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☐ Steel Stamps
☐ Stocks, die
☐ Storage Racks
☐ Straightening Machy.
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☐ Swaging Machines
☐ Tap Holders
☐ Tapping Mch. & At.
☐ Taps collapsing
☐ Thread Grind. Mch.
☐ Thread Rolling Mch.
☐ Tool bits, hi. sp. st.
☐ Tool Holders
☐ Toolmakers Instrumts.
☐ Tools, boring
☐ Tools, cutting
☐ Tools, filing
☐ Tools, lathe & plan.
☐ Tools, machinists'
☐ Tools, sawing
☐ Tracing cloth and paper
☐ Transmission var. sp.
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☐ Tumbling Barrels
☐ Turning Tools
☐ Universal Joints
☐ Valves, hydraulic
☐ V Belts
☐ Vises, bench
☐ Vises, machine
☐ Vises, pipe
☐ Vises, planer & shap.
☐ Washers, lock
☐ Welding Equipment
☐ Welding & Cutting Gases
☐ Welders, arc
☐ Welders, portable
☐ Welders, elec. spot
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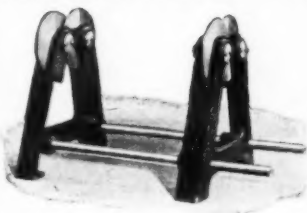
The new truck is all-steel electric welded into one rigid unit. Table top is of $\frac{3}{8}$ " steel plate, turned down measuring 26" wide by 43" long. Edges 2" over an angle steel frame and of the top overhang the frame, thus it can be pushed flush against the press receiving the die. Uprights at each of the four corners are steel channel working in square tubular posts. Positive cam locks, engaging with a twist of the wrist, hold the table solidly at any joint of lift. Lowered, the top is 28" from the floor. Fully raised, the height is 42" or a total lift of 14". Lifting mechanism is a steel screw operating through a bronze nut and actuating lifting chains (or cables). A Timken bearing at the end of the

screw absorbs the thrust load. Vise type handle with double grips makes operation of the machine possible when loads overhang. Running gear is two 14 x 2½" NI-Steel-Iron wheels, rear, and a pair of 6" ball bearing Forge Weld casters with right and



left hand swivel locks and wheel brake, front. All wheels turn over Hyatt bearings equipped for high pressure lubrication.

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72 in.	66 in.	5,000
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- Adapters, Adjustable**
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- Air Filtering Machines**
Lincoln Electric Co., Cleveland, Ohio
- Alloys, Low Melting**
Cerro de Pasco Copper Corp., 44 Wall St., N. Y.
- Angle Plates**
McMahon Co., Frank, Dayton, Ohio
- Arbors**
Kearney & Trecker Corp., Milwaukee, Wis.
- Balancing Ways**
Anderson Bros. Mfg. Co., Rockford, Ill.
Sundstrand Machine Tool Co., Rockford, Ill.
- Baling Presses**
Galland-Henning Mfg. Co., Milwaukee, Wis.
- Band Saw Machines, for Metal**
Armstrong-Blum Mfg. Co., 5741 Bloomingdale Ave., Chicago, Ill.
Delta Mfg. Co., Milwaukee, Wis.
Grob Bros., Grafton, Wis.
Oliver Machinery Co., Grand Rapids, Mich.
Tannewitz Works, Grand Rapids, Mich.
- Bar Cutters**
Buffalo Forge Company, Buffalo, N. Y.
Ryerson & Son, Jos. T., 16th & Rockwell, Chgo.
- Belt Sanders**
Skilsaw, Inc., 3304 Elston Ave., Chicago, Ill.
- Belts, V-Type**
Delta Mfg. Co., Milwaukee, Wis.
- Bench Legs, Steel**
Standard Pressed Steel Co., Jenkintown, Pa.
- Benches, Work—All Steel Stools**
Pollard Bros. Mfg. Co., 5305 N.W. Hwy., Chgo.
- Bending Machines, Hand and Power**
Armstrong-Blum Mfg. Co., 5741 Bloomingdale Ave., Chicago, Ill.
Buffalo Forge Company, Buffalo, N. Y.
Lewthwaite Machine Co., 311 E. 47th St., New York, N. Y.
Pedrick Tool & Mch. Co., Philadelphia, Pa.
- Bending Rolls**
Buffalo Forge Co., Buffalo, N. Y.
Marshalltown Mfg. Co., Marshalltown, Ia.
Ryerson & Son, Jos. T., 16th & Rockwell, Chgo.
- Bins**
Stackbin Corp., Providence, R. I.
- Blades, Hack Saw**
Racine Tool & Mch. Co., Racine, Wis.
- Blowers, Portable Electric**
Breuer Electric Mfg. Co., 5108 N. Ravenswood Ave., Chicago
Buffalo Forge Company, Buffalo, N. Y.
Clements Mfg. Co., 6650 Naragansett, Chicago
General Blower Co., 401 N. Peoria St., Chicago
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- Bolts and Nuts**
Triplex Screw Co., Cleveland, Ohio
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Rigid Tool Holder Co., Detroit, Mich.
Starrett Co., L. S., Athol, Mass.
- Boring Bars**
Pedrick Tool & Mch. Co., Philadelphia, Pa.
- Boring Heads**
Flynn Manufacturing Co., Detroit, Mich.
- Boring Machines**
Hack Univ. Die M. M. Co., 440 N. Oakley, Chgo.
Pedrick Tool & Mch. Co., Philadelphia, Pa.
- Brakes, Hand and Power**
Drehs & Krump Mfg. Co., 7440 So. Loomis Blvd., Chicago, Ill.
Ryerson & Son, Jos. T., 16th & Rockwell, Chgo.
Verson Allsteel Press Co., 9303 S. Kenwood Ave., Chicago, Ill.
- Brazers, Electric**
Grob Brothers, Grafton, Wis.
Oliver Machinery Co., Grand Rapids, Mich.
- Broaches, Spline and Square**
Taylor Machine Co., Cleveland, Ohio
- Broaching Machine Tools**
Hack Univ. Die M. M. Co., 440 N. Oakley, Chgo.
- Buffers, Bench**
Cincinnati Electrical Tool Co., Cincinnati, O.
Hammond Mch. Builders, Kalamazoo, Mich.
Mall Tool Co., 7742 S. Chicago Ave., Chicago, Ill.
Vonnegut Moulder Corp., Indianapolis, Ind.
- Buffers, Pedestal**
Cincinnati Electrical Tool Co., Cincinnati, Ohio
Vonnegut Moulder Corp., Indianapolis, Ind.
- Bulldozers**
Bentley Mch. & Mfg. Co., Hammond, Ind.
- Bushings, Ig**
Acme Industrial Co., 210 N. Laflin St., Chicago
- Bushings, Steel**
Acme Industrial Co., 210 N. Laflin St., Chicago
Baumbach Mfg. Co., E. A., 1812 So. Kilbourne Ave., Chicago, Ill.
Universal Engineering Co., Frankenthuth, Mich.
- Calipers**
Comet Tools, Inc., 39 Union Square, New York
Parks Sales Co., 3 Park Pl., New York, N. Y.
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Modern Collet & Machine Co., Ecorse, Mich.
- Cap Screws**
Triplex Screw Co., Cleveland, Ohio
- Centering Machines**
Cullman Wheel Co., 1359 Altgeld St., Chicago
Sundstrand Machine Tool Co., Rockford, Ill.
- Center Points**
Ford Motor Co., Johansson Div., Dearborn, Mich.
- Centers, Lathe**
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Master Chrome Service, Cleveland, Ohio
- Chucking Fingers**
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Morrison Machine Products Div., Elmira, N. Y.
- Chucks, Air**
Logansport Machine, Inc., Logansport, Ind.
Tomkins-Johnson Co., Jackson, Mich.
- Chucks, Automatic**
Proenier Safety Chuck Co., 14 S. Clinton St., Chicago, Ill.
- Chucks, Collet**
Hardinge Brothers, Inc., Elmira, N. Y.
Proenier Safety Chuck Co., 14 S. Clinton St., Chicago, Ill.
- Universal Eng. Co., Frankenthuth, Mich.**
- Chucks, Drill and Tap**
Errington Mech. Labor., Staten Island, N. Y.
Etico Tool Co., 594 Johnson Ave., Brooklyn, N. Y.
Hartford Special Mach'y Co., Hartford, Conn.
Proenier Safety Chuck Co., 14 S. Clinton St., Chicago, Ill.
- Chucks, Drill, Keyless**
Motor Tool Mfg. Co., Detroit, Mich.

Buyers' Directory

Chucks, Drill, for Screw Machines

Motor Tool Mfg. Co., Detroit, Mich.

Chucks, Lathe

L-W Chuck Co., Toledo, Ohio

Sampson Tool Co., 101 Walker St., New York

Chucks, Magnetic

Brown & Sharpe Mfg. Co., Providence, R. I.

Chucks, Positive Drive

Apex Mch. & Tool Co., Dayton, Ohio

Chucks, Quick Change

Apex Mch. & Tool Co., Dayton, Ohio

Glenzer Company, J. C., Detroit, Mich.

Jarvis Co., Chas. L., Middletown, Conn.

Procunier Safety Chuck Co., 14 So. Clinton St., Chicago, Ill.

Chucks, Safety Tapping

Apex Mch. & Tool Co., Dayton, Ohio

Chucks, Vertical Float

Apex Mch. & Tool Co., Dayton, Ohio

Clamps, Toggle, Univ. Action

Knu-Vise Products Co., Detroit, Mich.

Clutches, Friction

Conway Clutch Co., Cincinnati, Ohio

Coil Winding Equipment

Ideal Commutator Dresser Co., Sycamore, Ill.

Collets and Feed Fingers

Modern Collet & Machine Co., Ecorse, Mich.

Morrison Machine Products Div., Elmira, N. Y.

Collets for All Lathes and Millers

Hardinge Brothers, Inc., Elmira, N. Y.

Modern Collet & Machine Co., Ecorse, Mich.

Sutton Tool Co., Detroit, Mich.

Collets, Quick Change

Jarvis Co., Chas. L., Middletown, Conn.

Collet Tubes

Modern Collet & Machine Co., Ecorse, Mich.

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Comparators

Federal Products Corp., Providence, R. I.

Compounds, Abrasive

Timesaver Prod. Co., 31 S. Desplaines, Chicago

Compounds, Grinding

Timesaver Prod. Co., 31 S. Desplaines, Chicago

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Counterbores

Glenzer Company, J. C., Detroit, Mich.

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Counters

Durant Mfg. Co., Milwaukee, Wis.

Countersinks

Glenzer Company, J. C., Detroit, Mich.

Couplings, Compression Shaft

W. H. Nicholson & Co., Wilkes-Barre, Pa.

Couplings, Flexible

Congress Tool & Die Co., Detroit, Mich.

Lowjoy Flex. Coupling Co., 5026 Lake, Chicago

W. H. Nicholson & Co., Wilkes-Barre, Pa.

Couplings, Friction Clutch

Conway Clutch Co., Cincinnati, Ohio

Couplings, Shaft

W. H. Nicholson & Co., Wilkes-Barre, Pa.

Cranes

Shaw Box Crane & Hoist Div., Muskegon, Mich.

Cut-Off Machines

Cincinnati Electrical Tool Co., Cincinnati, Ohio

Cut-Off Saws

Oliver Machinery Co., Grand Rapids, Mich.

Tannewitz Works, Grand Rapids, Mich.

Cutting-off Tools

Luers, Milton J., Detroit, Mich.

Cutter Grinders

Gorton Machine Co., Geo., Racine, Wis.

Oliver Instrument Co., Adrian, Mich.

Cutters

Progressive Tool & Cutter Co., Ferndale, Mich.

Putnam Tool Co., Detroit, Mich.

Tomkins-Johnson Co., Jackson, Mich.

Cutters, Milling

Brown & Sharpe Mfg. Co., Providence, R. I.

Eastern Cutter Salvage Corp., Newark, N. J.

Master Tool Co., Cleveland, Ohio

Reisinger Mfg. Co., Rochester, N. Y.

Reus Tool Company, Detroit, Mich.

Scully-Jones & Co., 1905 S. Rockwell St., Chicago, Ill.

Willey's Carbide Tool Co., Detroit, Mich.

Cutters, Gear

Michigan Tool Co., Detroit, Mich.

Cutters, Woodruff

Glenzer Company, J. C., Detroit, Mich.

Cutting and Notching Mch.—Angle Iron

Ryerson & Son, Jos. T., 16th & Rockwell, Chgo.

Cylinders, Air

Bell Machine Co., Oskosh, Wis.

Hanna Engineering Works, 1763 Elston, Chicago

Logansport Machine, Inc., Logansport, Ind.

Tomkins-Johnson Co., Jackson, Mich.

Cylinder Boring Machines, Portable

Pedrick Tool & Mch. Co., Philadelphia, Pa.

Demagnetizers

Alofs Manufacturing Company, Grand Rapids, Mich.

Electro-Matic Products Co., 4820 Deming Place, Chicago, Ill.

Luma Electric Equipment Co., Toledo, Ohio

L-W Chuck Co., Toledo, Ohio

Printz Electric Co., Detroit, Mich.

Victor Machinery Co., 130 S. Clinton St., Chicago, Ill.

Dies

McKenna Metals Co., Latrobe, Pa.

Die Castings

Congress Tool & Die Co., Detroit, Mich.

Die Cushions

Dayton Rogers Mfg. Co., Minneapolis, Minn.

Die Duplicating Machines

Gorton Machine Co., Geo., Racine, Wis.

Die Filers

Continental Machine Specialties, Minneapolis

Groh Brothers, Grafton, Wis.

Jarvis Co., Charles L., Middletown, Conn.

Oliver Instrument Co., Adrian, Mich.

Postal Filing Mch. Co., Minneapolis, Minn.

Die Heads, Self-opening

Rickert-Shafer Co., Erie, Penna.

Die Making Machines

Continental Machine Specialties, Minneapolis

Groh Brothers, Grafton, Wis.

Hack Only, Die M. M. Co., 440 N. Oakley, Chgo.

Harvey Mfg. Co., 161 Grand St., New York

Oliver Instrument Co., Adrian, Mich.

Pratt & Whitney, Hartford, Conn.

Die Makers' Supplies

Cerro de Pasco Copper Corp., 44 Wall St., New York, N. Y.

Dayton Rogers Mfg. Co., Minneapolis, Minn.

Die Sets

Baumbach Mfg. Co., E. A., 1812 So. Kilbourne Ave. Chicago, Ill.

Dies, Blank and Forming

American Tool Works, Inc., Hartford, Conn.

Hamilton Tool Company, Hamilton, Ohio

Dies, Hole Punching

Strippit Corp., Buffalo, N. Y.

Dies, Notching

Strippit Corp., Buffalo, N. Y.

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Dividing Heads

Wm. Carroll & Son, Norwood, Cincinnati, O.
L-W Chuck Co., Toledo, Ohio

Dowel Pins, Steel

Acme Industrial Co., 210 N. Laflin St., Chicago
Humbach Mfg. Co., E. A., 1812 So. Kilbourne
Ave., Chicago, Ill.

Drawing Instruments

Wade Instrument Co., Cleveland, Ohio.

Dressers, Angle

Vince Tool Co., Detroit, Mich.

Dressers, Contour Grinding

Brickner-Kropf Mch. Co., Muskegon Heights,
Mich.

Dressers, Emery Wheel

Carboloy Co., Detroit, Mich.

Dressers, Grinding Wheel

Deamond-Stephan Mfg. Co., Urbana, Ohio

Dressers, Radius

Vince Tool Co., Detroit, Mich.

Dressing Tools

Willey's Carbide Tool Co., Detroit, Mich.

Drill Bushings

Acme Industrial Co., 210 N. Laflin St., Chicago
Universal Eng. Co., Frankenmuth, Mich.

Drills, Core

Glenzer Company, J. C., Detroit, Mich.

Drills, Electric

Cincinnati Electrical Tool Co., Cincinnati, Ohio
Mall Tool Co., 7742 S. Chicago Ave., Chicago, Ill.
Master Tool Co., Cleveland, Ohio
Skilaw, Inc., 3304 Elston Ave., Chicago, Ill.
Stanley Electric Tool Div., New Britain, Conn.

Drill Grinders

Black Diamond Saw & Machine Works, Inc.,
Natick, Mass.
Gullmeyer & Livingston Co., Gr. Rapids, Mich.
Oliver Instrument Co., Adrian, Mich.
Sellers & Co., Wm., Philadelphia, Pa.
Star Electric Motor Co., Bloomfield, N. J.

Drill Presses

Walker-Turner Company, Plainfield, N. J.

Drill Press Heads

Walker-Turner Company, Plainfield, N. J.

Drilling Machines, Bench

Atlas Press Co., Kalamazoo, Mich.
Buffalo Forge Company, Buffalo, N. Y.
Burke Machine Tool Co., Conneaut, Ohio
Delta Mfg. Co., Milwaukee, Wis.

Drilling Machines, Multiple Spindle

Buffalo Forge Co., Buffalo, N. Y.
Drilling Machines, Portable Electric
Mall Tool Co., 7742 S. Chicago Ave., Chicago, Ill.
Skilaw, Inc., 3304 Elston Ave., Chicago, Ill.
Strand Co., N. A., 5001 N. Wolcott St., Chicago

Drilling Machines, Post

Buffalo Forge Co., Buffalo, N. Y.

Drilling Machines, Sensitive

Atlas Press Co., Kalamazoo, Mich.
Buffalo Forge Company, Buffalo, N. Y.
Burke Machine Tool Co., Conneaut, Ohio
Hamilton Tool Co., Hamilton, Ohio

Drilling Machines, Vertical

Atlas Press Co., Kalamazoo, Mich.
Buffalo Forge Company, Buffalo, N. Y.

Drives, Lathe

Berkeley Engineering Co., Cleveland, Ohio
Culman Wheel Co., 1359 Altgeld St., Chicago
Hardinge Brothers, Inc., Elmira, N. Y.
Hawkins, E., Downers Grove, Ill.
Powermaster, 25 E. Fourth St., New York, N. Y.
Westlof Tool & Mfg. Co., Detroit, Mich.

Drives, Machine Tool

Westlof Tool & Mfg. Co., Detroit, Mich.

Drives, Shaper

Westlof Tool & Mfg. Co., Detroit, Mich.

Drives, Variable Speed

Powermaster, 25 E. 4th St., New York, N. Y.

Drives, Worm

Michigan Tool Co., Detroit, Mich.

Electrodes

Fuchs Mch. & Supply Co., Omaha, Nebr.

Elevating Tables

Hamilton Tool Company, Hamilton, Ohio

Johnson Co., O., Brookfield, Ill.

Midwest Tool & Engineer. Co., Dayton, Ohio

Emery Wheel Dressers and Cutters

Western Tool & Mfg. Co., Springfield, Ohio

End Mills

Glenzer Company, J. C., Detroit, Mich.

Master Tool Co., Cleveland, Ohio

Midwest Tool & Mfg. Co., Detroit, Mich.

Progressive Tool & Cutter Co., Ferndale, Mich.

Renn Tool Company, Detroit, Mich.

Willey's Carbide Tool Co., Detroit, Mich.

Engraving Machines

Gorton Machine Co., Geo., Racine, Wis.
Ideal Commutator Dresser Co., Sycamore, Ill.
Luma Electric Equipment Co., Toledo, Ohio
Printz Electric Co., Detroit, Mich.

Etchers, Electric

Annis Co., R. B., Indianapolis, Ind.

Exhaust Blowers

Buffalo Forge Company, Buffalo, N. Y.

Experimental Work

American Tool Works, Inc., Hartford, Conn.

Extractors, Tap

Walton Co., Hartford, Conn.

Facers, Spot

Glenzer Company, J. C., Detroit, Mich.

Feed Fingers for Auto. Screw Machines

Modern Collet & Machine Co., Ecorse, Mich.
Morrison Machine Products Div., Elmira, N. Y.
Sutton Tool Co., Detroit, Mich.

Files

Oliver Instrument Co., Adrian, Mich.

Files, Rotary

American Rotary Tools Co., 44 Whitehall,
New York, N. Y.
Ford Mfg. Co., M. A., Davenport, Iowa
Grobet File Corp. of America, 3 Park Place,
New York, N. Y.
Hamilton Tool Co., Hamilton, Ohio
Jarvis Co., Charles L., Middletown, Conn.
Pratt & Whitney Div., Hartford, Conn.

Filing Machines

Continental Machine Specialties, Minneapolis
Grob Brothers, Grafton, Wis.
Hack Univ. Die M. M. Co., 440 N. Oakley, Chgo.
Harvey Mfg. Co., 161 Grand St., New York
Mall Tool Co., 7742 S. Chicago Ave., Chicago, Ill.
Oliver Instrument Co., Adrian, Mich.

Filing Room Equipment

Wardwell Manufacturing Co., Cleveland, Ohio

Flexible Couplings

Lovejoy Flexible Coupling Co., 5026 Lake, Chgo.

Flexible Shaft Couplings

Lovejoy Flexible Coupling Co., 5026 Lake, Chgo.
W. H. Nicholson & Co., Wilkes-Barre, Pa.

Flexible Shafts and Accessories

American Rotary Tools Co., 44 Whitehall St.,
New York, N. Y.
Haskins Co., R. G., 623 S. California, Chicago.
Jarvis Co., Charles L., Middletown, Conn.
Mall Tool Co., 7742 S. Chicago Ave., Chicago
Stow Mfg. Company, Binghamton, N. Y.
Strand & Co., 5001 N. Wolcott, Chicago
Walker-Turner Company, Plainfield, N. J.
Wyzenbeck & Staff, Inc., 838 W. Hubbard, Chgo.

Buyers' Directory

Flexible Shaft Machinery

Haskins Co., R. G., 623 S. California, Chicago.
 Jarvis Co., Charles L., Middletown, Conn.
 Mall Tool Co., 7742 S. Chicago Ave., Chicago
 Parks Sales Co., 3 Park Pl., New York, N. Y.
 Pratt & Whitney, Hartford, Conn.
 Strand & Co., 5001 N. Wolcott, Chicago
 Wyzenbeck & Staff, Inc., 838 W. Hubbard, Chgo.

Floating Holders

Glenzer Company, J. C., Detroit, Mich.

Floating Holders, Parallel Float

Apex Mch. & Tool Co., Dayton, Ohio

Floating Holders, Parallel & Rad.

Apex Mch. & Tool Co., Dayton, Ohio

Flue Lathes

Marshalltown Mfg. Co., Marshalltown, Ia.

Flue Welders

Marshalltown Mfg. Co., Marshalltown, Ia.

Forming Tools

Michigan Tool Co., Detroit, Mich.

Morrison Machine Products Div., Elmira, N. Y.

Furnaces, Industrial

Strong, Carlisle & Hammond Co., Cleveland, O.

Furniture, Machine Shop

Standard Pressed Steel Co., Jenkintown, Pa.
 Western Tool & Mfg. Co., Springfield, Ohio

Gages

Chicago Dial Indicator Co., 180 N. Wacker, Chg.
 Federal Products Corp., Providence, R. I.
 Ford Motor Co., Johnson Div., Dearborn, Mich.
 Hammond Mch. Builders, Kalamazoo, Mich.
 United Prec. Prod. Co., 4618 W. Huron, Chgo.
 Vinco Tool Co., Detroit, Mich.
 Willey's Carbide Tool Co., Detroit, Mich.

Gages, Pin, Plug, Ring and Snap

American Tool Works, Inc., Hartford, Conn.
 United Prec. Prod. Co., 4618 W. Huron, Chgo.

Gages, Pressure

Marshalltown Mfg. Co., Marshalltown, Ia.

Gages, Special

Federal Products Corp., Providence, R. I.
 Ford Motor Co., Johnson Div., Dearborn, Mich.
 Starrett Co., L. S., Athol, Mass.

Gages, Taper

Hartford Special Machinery Co., Hartford, Conn.

Gears

Abart Gear & Mch. Co., 4832 W. 16th St., Chgo.
 Atlantic Gear Works, 200 Lafayette St., New York, N. Y.
 Taylor Machine Co., Cleveland, Ohio

Generators, Motor

Chicago Elec. Co., 1330 W. Cermak Rd., Chgo.
 Lincoln Electric Co., Cleveland, Ohio
 Star Electric Motor Co., Bloomfield, N. J.

Goggles

Sellstrom Mfg. Co., 646 N. Aberdeen St., Chicago, Ill.

Grinder Live Centers

Motor Tool Mfg. Co., Detroit, Mich.

Grinders, Air

M-B Products, Detroit, Mich.

Grinders, Bench

Baldor Electric Co., St. Louis, Mo.
 Cincinnati Electrical Tool Co., Cincinnati, Ohio
 Hammond Mch. Builders, Kalamazoo, Mich.
 Mall Tool Co., 7742 S. Chicago Ave., Chicago, Ill.
 Stanley Electric Tool Div., New Britain, Conn.
 Vonnegut Moulder Corp., Indianapolis, Ind.
 Walker-Turner Company, Plainfield, N. J.

Grinders, Disc

Cincinnati Electrical Tool Co., Cincinnati, Ohio
 Mall Tool Co., 7742 S. Chicago Ave., Chicago, Ill.
 Oliver Machinery Co., Grand Rapids, Mich.
 Wyzenbeck & Staff, Inc., 838 W. Hubbard, Chgo.

Grinders, Flexible Shaft

Haskins Co., R. G., 623 S. California, Chicago.
 Jarvis Co., Charles L., Middletown, Conn.
 Mall Tool Co., 7742 S. Chicago Ave., Chicago
 Stanley Electric Tool Div., New Britain, Conn.
 N. A. Strand & Co., 5001 N. Wolcott, Chicago

Grinders, Hand

Chicago Wheel & Mfg. Co., 1101 W. Monroe St., Chicago, Ill.
 Cincinnati Electrical Tool Co., Cincinnati, Ohio
 Dumore Co., Racine, Wis.
 Duro Metal Products Co., 2651 N. Kildare Ave., Chicago, Ill.
 Mall Tool Co., 7742 S. Chicago Ave., Chicago, Ill.
 M-B Products Co., Detroit, Mich.
 Skilshaw, Inc., 3304 Elston Ave., Chicago, Ill.

Grinders, Heavy Duty

Cincinnati Electrical Tool Co., Cincinnati, Ohio
 Vonnegut Moulder Corp., Indianapolis, Ind.

Grinders, High Speed

Bridgeport Machines, Inc., Bridgeport, Conn.
 Chicago Wheel & Mfg. Co., 1101 W. Monroe St., Chicago, Ill.
 Jarvis Co., Charles L., Middletown, Conn.
 Mall Tool Co., 7742 S. Chicago Ave., Chicago

Grinders, Pedestal Electric

Baldor Electric Co., St. Louis, Mo.
 Cincinnati Electrical Tool Co., Cincinnati, Ohio
 Hammond Mch. Builders, Kalamazoo, Mich.

Grinders, Precision

Dumore Co., Racine, Wis.

Grinders, Production Surface

Bergram Mech. Eng. Co., New Britain, Conn.
 Gallmeier & Livingston Co., Gr. Rapids, Mich.

Grinders, Reamer and Cutter

Lee & Son Co., K. O., Aberdeen, S. Dak.

Grinders, Snagging

Cincinnati Electrical Tool Co., Cincinnati, Ohio

Grinders, Surface, Auto. Feed

Reid Brothers Co., Beverly, Mass.

Grinders, Swing Frame

Vonnegut Moulder Corp., Indianapolis, Ind.

Grinders, Univ. Tool & Cutter

LeBlond Mch. Tool Co., R. K., Cincinnati, Ohio

Grinders, Utility

Bergram Mech. Eng. Co., New Britain, Conn.

Grinding Attachments, Drill

Atlas Press Co., Kalamazoo, Mich.
 Carlson Mfg. Co., C. H., Minneapolis, Minn.
 Mall Tool Co., 7742 S. Chicago Ave., Chicago, Ill.
 Oliver Instrument Co., Adrian, Mich.

Grinding, Centerless (Contract)

Eastern Centerless Grind. Co., Hartford, Conn.
 Helm Company, Fairfield, Conn.

Grinding Machines, Belt

Armigo Co., Milwaukee, Wis.
 Walls Sales Corp., 90 Warren St., New York

Grinding Machines, Cutter, Reamer and Tool

Brown & Sharpe Mfg. Co., Providence, R. I.
 Gallmeier & Livingston Co., Grand Rapids, Mich.
 National Machine Tool Co., Racine, Wis.
 Oliver Instrument Co., Adrian, Mich.
 Prosser & Son, 120 Wall St., New York, N. Y.

Grinding Machines, Internal

National Machine Tool Co., Racine, Wis.

Buyers' Directory

- Grinding Machines, Portable Electric**
Chicago Wheel & Mfg. Co., 1101 W. Monroe St., Chicago, Ill.
Duro Metal Products Co., 2651 N. Kildare Ave., Chicago, Ill.
Haskins Co., R. G., 623 S. California, Chicago.
Jarvis Co., Charles L., Middletown, Conn.
Mall Tool Co., 7742 S. Chicago Ave., Chicago
National Machine Tool Co., Racine, Wis.
Pratt & Whitney, Hartford, Conn.
Stow Mfg. Company, Binghamton, N. Y.
Strand Co., N. A., 5001 N. Wolcott St., Chicago
- Grinding Machines, Surface**
Gallmeyer & Livingston Co., Grand Rapids, Mich.
Grinding Machines, Tap
Gallmeyer & Livingston Co., Grand Rapids, Mich.
Oliver Instrument Co., Adrian, Mich.
- Grinding Machines, Tool**
Hammond Mich., Builders, Kalamazoo, Mich.
Prosser & Son, 129 Wall St., New York, N. Y.
- Grinding Wheels**
Chicago Wheel & Mfg. Co., 1101 W. Monroe St., Chicago, Ill.
Mall Tool Co., 7742 S. Chicago Ave., Chicago, Ill.
- Hack Saw Blades**
Armstrong-Blum Mfg. Co., 5741 Bloomingdale Ave., Chicago, Ill.
Starrett Co., L. S., Athol, Mass.
- Hack Saw Machines**
Armstrong-Blum Mfg. Co., 5741 Bloomingdale Ave., Chicago, Ill.
L. W. Chuck Co., Toledo, Ohio
Racine Tool & Mch. Co., Racine, Wis.
- Hammers, Chipping**
Master Tool Co., Cleveland, Ohio
- Hammers, Forge**
Murray Mfg. Co., D. J., Wausau, Wis.
- Hammers, Portable Electric**
Stanley Electric Tool Div., New Britain, Conn.
- Handles, Precision, Machine**
Cinc. Ball Crank Co., Cincinnati, Ohio
- Hand Saws, Portable Electric**
Skillsaw, Inc., 3304 Elston Ave., Chicago, Ill.
- Hand Screw Machine Live Centers**
Motor Tool Mfg. Co., Detroit, Mich.
- Hand Screw Machines, Precision**
Hardinge Brothers, Inc., Elmira, N. Y.
- Handpieces, Reciprocating**
Stow Mfg. Company, Binghamton, N. Y.
- Heads, Boring**
Flynn Manufacturing Co., Detroit, Mich.
- Hinges, Continuous Steel**
Auto Moulding & Mfg. Co., 2326 S. Canal, Chgo.
- Hinges, Plain and Offset**
Auto Moulding & Mfg. Co., 2326 S. Canal, Chgo.
- Hobs**
Michigan Tool Co., Detroit, Mich.
- Hoists, Electric**
Shaw Box Crane & Hoist Div., Muskegon, Mich.
- Holders, Tool**
Rigid Tool Holder Co., Detroit, Mich.
- Hole Cutters**
Wyzenbeek & Staff, Inc., 838 W. Hubbard, Chgo.
- Index Centers**
Brown & Sharpe Mfg. Co., Providence, R. I.
Wm. Carroll & Son, Norwood, Cincinnati, Ohio
L. W. Chuck Co., Toledo, Ohio
- Indicators, Dial**
Federal Products Corp., Providence, R. I.
Starrett Co., L. S., Athol, Mass.
- Indicators, Speed**
Starrett Co., L. S., Athol, Mass.
- Indicators, Surface Test**
Federal Products Corp., Providence, R. I.
Starrett Co., L. S., Athol, Mass.
- Jigs and Fixtures**
American Tool Works, Inc., Hartford, Conn.
Hamilton Tool Company, Hamilton, Ohio
Hartford Special Machinery Co., Hartford, Conn.
- Joints, Universal**
Apex Machine Co., Dayton, Ohio
Borgeson Mfg. Co., Torrington, Conn.
- Keyseating Machines**
Burr & Son, John T., Brooklyn, N. Y.
- Lapping Machines**
Hack Univ. Die M. M. Co., 440 N. Oakley, Chgo.
- Lathe Live Centers**
Modern Machine Corp., Brooklyn, N. Y.
Motor Tool Mfg. Co., Detroit, Mich.
- Lathe Drives**
Cullum Wheel Co., 1359 Altgeld St., Chicago
Hardinge Brothers, Inc., Elmira, N. Y.
- Lathe, Automatic**
LeBlond Mch. Tool Co., R. K., Cincinnati, Ohio
- Lathe, Back Geared**
Atlas Press Co., Kalamazoo, Mich.
Rivett Lathe & Grinder, Inc., Brighton, Boston
South Bend Lathe Works, South Bend, Ind.
- Lathe, Bench**
Atlas Press Co., Kalamazoo, Mich.
Delta Mfg. Co., Milwaukee, Wis.
Hardinge Brothers, Inc., Elmira, N. Y.
Rivett Lathe & Grinder, Inc., Brighton, Boston
South Bend Lathe Works, South Bend, Ind.
Wade Tool Co., Waltham, Mass.
- Lathe, Deep Hole Boring**
LeBlond Mch. Tool Co., R. K., Cincinnati, Ohio
- Lathe, Engine**
LeBlond Mch. Tool Co., R. K., Cincinnati, Ohio
- Lathe, Gap**
LeBlond Mch. Tool Co., R. K., Cincinnati, Ohio
- Lathe, Hollow Spindle**
LeBlond Mch. Tool Co., R. K., Cincinnati, Ohio
- Lathe, Multicut**
LeBlond Mch. Tool Co., R. K., Cincinnati, Ohio
- Lathe, Manufacturing**
Sundstrand Machine Tool Co., Rockford, Ill.
- Lathe, Polishing & Buffing**
Cincinnati Electrical Tool Co., Cincinnati, O.
Hammond Mich., Builders, Kalamazoo, Mich.
Hardinge Brothers, Inc., Elmira, N. Y.
- Lathe, Precision**
South Bend Lathe Works, South Bend, Ind.
- Lathe, Precision Bench**
Atlas Press Co., Kalamazoo, Mich.
South Bend Lathe Works, South Bend, Ind.
- Lathe, Screw Cutting**
Atlas Press Co., Kalamazoo, Mich.
Hardinge Brothers, Inc., Elmira, N. Y.
South Bend Lathe Works, South Bend, Ind.
Wade Tool Co., Waltham, Mass.
- Lathe, Speed**
Schauer Machine Co., Cincinnati, Ohio
- Lathe, Toolroom**
Atlas Press Co., Kalamazoo, Mich.
Hardinge Brothers, Inc., Elmira, N. Y.
LeBlond Mch. Tool Co., R. K., Cincinnati, O.
South Bend Lathe Works, South Bend, Ind.
- Layout Fluid**
Dayton Rogers Mfg. Co., Minneapolis, Minn.
- Layout Tables**
Busch Co., J. C., Milwaukee, Wis.
- Leader Pins, Steel**
Acme Industrial Co., 210 Laflin St., Chicago, Ill.
- Leather Oil Retainers**
Gita Bros. Mfg. Co., 1890 S. Kilbourn, Chicago
- Live Lathe Centers**
Glenzer Company, J. C., Detroit, Mich.
Modern Machine Corp., Brooklyn, N. Y.
Motor Tool Mfg. Co., Detroit, Mich.
- Lubricators, Air**
Norgren, C. A., Denver, Colorado

Buyers' Directory

Lubricators, Automatic

M-B Products Co., Detroit, Mich.
Norgren Co., C. A., Denver, Colorado

Magnetic Chuck Demagnetizers

Electro-Matic Products Co., 4820 Deming Place,
Chicago, Ill.

Mandrels

Lee & Son Co., K. O., Aberdeen, S. Dak.

Mandrels, Expanding

W. H. Nicholson & Co., Wilkes-Barre, Pa.
Western Tool & Mfg. Co., Springfield, Ohio

Marking Machines

Ideal Commutator Dresser Co., Sycamore, Ill.
Schmidt, Gen. T., Inc., 1802 Belle Plaine Ave.,
Chicago, Ill.

Meters, Air Velocity

Ill. Testing Lab., 150 W. Austin, Chicago.

Milling Attachments

Bridgeport Machines, Inc., Bridgeport, Conn.
Burke Machine Tool Co., Conneaut, Ohio
Win. Carroll & Son, Norwood, Cincinnati, Ohio
Hack Tool, Die M. M. Co., 440 N. Oakley, Chgo.
Kearney & Trecker Corp., Milwaukee, Wis.
Production Machine Co., Cincinnati, Ohio

Milling Cutters

Master Tool Co., Cleveland, Ohio

Milling Machine Live Centers

Motor Tool Mfg. Co., Detroit, Mich.

Milling Machines, Bench

Burke Machine Tool Co., Conneaut, Ohio
Hardinge Brothers, Inc., Elmira, N. Y.
Sundstrand Machine Tool Co., Rockford, Ill.

Milling Machines, Hand

Burke Machine Tool Co., Conneaut, Ohio
Pedrick Tool & Mch. Co., Philadelphia, Pa.
Sundstrand Machine Tool Co., Rockford, Ill.

Milling Machines, Plain

Burke Machine Tool Co., Conneaut, Ohio
Kearney & Trecker Corp., Milwaukee, Wis.
Sundstrand Machine Tool Co., Rockford, Ill.

Milling Machines, Universal

Brown & Sharpe Mfg. Co., Providence, R. I.
Gorton Machine Co., Geo., Racine, Wis.
Kearney & Trecker Corp., Milwaukee, Wis.

Milling Machines, Vertical

Blank & Buxton Mch. Co., Jackson, Mich.
Gorton Machine Co., Geo., Racine, Wis.
Kearney & Trecker Corp., Milwaukee, Wis.

Mills, Hollow

Reisinger Mfg. Co., Rochester, N. Y.

Motors, Electric

Chicago Elec. Co., 1329 W. Cermak Rd., Chgo.
Lincoln Electric Co., Cleveland, Ohio
Star Electric Motor Co., Bloomfield, N. J.

Motors, Elec. Internal Brakes

Star Electric Motor Co., Bloomfield, N. J.

Motor-Generator Sets

Chicago Electric Co., 1329 W. Cermak Rd., Chgo.

Motor Drives, Universal

Berkeley Engineering Co., Cleveland, Ohio
Cushman Wheel Co., 1329 Altgeld St., Chicago
Powermaster, 25 E. Fourth St., New York, N. Y.
Turner Uni-Drive Co., Kansas City, Mo.

Motor Units, Worm Gear

Star Electric Motor Co., Bloomfield, N. J.

Moulds & Ladles, Hammer and Vise

Johnson Tool Co., East Providence, R. I.

Multiple Oilers

Gits Bros. Mfg. Co., 1860 S. Kilbourn, Chicago

Nails

Hassall, Inc., John, Brooklyn, N. Y.

Nibbling Machines

Libert Machine Co., Green Bay, Wis.
National Machine Tool Co., Racine, Wis.

Nut Setters

Cincinnati Electrical Tool Co., Cincinnati, Ohio

Oil Cups

Gits Bros. Mfg. Co., 1860 S. Kilbourn, Chicago

Oil Gauges

Gits Bros. Mfg. Co., 1860 S. Kilbourn, Chicago

Oil and Grease Seals

Gits Bros. Mfg. Co., 1860 S. Kilbourn, Chicago

Oilers, Automatic

Trico Fuse Mfg. Co., Milwaukee, Wis.

Pans, Tote

Pasman Bros., 705 W. Washington, Chicago

Parallels

Ford Motor Co., Johansson Div., Dearborn, Mich.

Pins, Leader and Dowel

Acme Industrial Co., 210 Ladin St., Chicago, Ill.
Baumbach Mfg. Co., E. A., 1812 So. Kilbourn
Ave., Chicago, Ill.

Pipe Threading Machines

Triplex Machine Co., Pittsfield, Mass.

Planers, Valve Seat, Portable

Pedrick Tool & Mch. Co., Philadelphia, Pa.

Pliers, Toggle

Knu-Vise Products Co., Detroit, Mich.

Point Thinning Machines

Oliver Instrument Co., Adrian, Mich.

Power Devices, Air-hydraulic

Logansport Machine, Inc., Logansport, Ind.

Press Brakes

Dreis & Krump Mfg. Co., 7440 Loomis Blvd.,
Chicago, Ill.

Verson Allsteel Press Co., 9303 S. Kenwood Ave.,
Chicago, Ill.

Ward Machinery Co., 564 W. Washington, Chi-
cago, Ill.

Press Feeds

Littell Machine Co., F. J., 4153 Ravenswood
Ave., Chicago, Ill.

Witteck Mfg. Co., 4309 W. 24th Place, Chicago

Presses, Arbor

Atlas Press Co., Kalamazoo, Mich.
Famco Machine Co., Racine, Wis.
Greenerd Arbor Press Co., Nashua, N. H.
Hanna Engineering Works, 1763 Elston, Chicago
Hawkins, F., Downers Grove, Ill.

W. H. Nicholson & Co., Wilkes-Barre, Pa.
Tomkins-Johnson Co., Jackson, Mich.
Wilson, K. R., Buffalo, N. Y.

Presses, Bench

Atlas Press Co., Kalamazoo, Mich.
Famco Machine Co., Racine, Wis.
Greenerd Arbor Press Co., Nashua, N. H.
Loshbough-Jordan Tool & Mch. Co., Elkhart, Ind.

Presses, Broaching

Greenerd Arbor Press Co., Nashua, N. H.

Presses, Foot

Famco Machine Co., Racine, Wis.

Presses, Forming

Marshalltown Mfg. Co., Marshalltown, Ia.

Presses, High Speed

Super Speed Press Corp., 55 Liberty, N.Y.C.

Presses, Hydraulic

Atlas Press Co., Kalamazoo, Mich.
Beatty Mch. & Mfg. Co., Hammond, Ind.
Greenerd Arbor Press Co., Nashua, N. H.

Presses, Inclined

Federal Press Co., Elkhart, Indiana.
Loshbough-Jordan Tool & Mch. Co., Elkhart, Ind.
Marshalltown Mfg. Co., Marshalltown, Ia.
Ross Co., David J., Benton Harbor, Mich.

Presses, Power

Dreis & Krump Mfg. Co., 7440 Loomis Blvd.,
Chicago, Ill.

Federal Press Co., Elkhart, Indiana

Eyerson & Son, Jos. T., 16th & Rockwell, Chgo.
Verson Allsteel Press Co., 9303 S. Kenwood Ave.,
Chicago, Ill.

Buyers' Directory

- Presses, Punch**
Drels & Krump Mfg. Co., 7440 Loomis Blvd., Chicago, Ill.
Lewthwaite Machine Co., 311 E. 47th St., New York, N. Y.
Marshalltown Mfg. Co., Marshalltown, Ia.
Ross Co., David J., Benton Harbor, Mich.
Super Speed Press Corp., 55 Liberty, N.Y.C.
- Presses, Sheet Metal**
Federal Press Co., Elkhart, Indiana
- Presses, Steel**
Verson Allsteel Press Co., 9303 S. Kenwood Ave., Chicago, Ill.
- Profiling Machines**
Gorton Machine Co., Geo., Racine, Wis.
Oliver Instrument Co., Adrian, Mich.
Wade Tool Co., Waltham, Mass.
- Protractors**
Parks Sales Co., 3 Park Pl., New York, N. Y.
- Pulleys**
Congress Tool & Die Co., Detroit, Mich.
Pulleys, Steel and Wood
Delta Mfg. Co., Milwaukee, Wis.
- Pumps**
Brown & Sharpe Mfg. Co., Providence, R. I.
Galland-Henning Mfg. Co., Milwaukee, Wis.
- Pumps, Centrifugal**
Logansport Machine, Inc., Logansport, Ind.
- Pumps, Coolant**
Ruthman Machinery Co., Cincinnati, Ohio
Tomkins-Johnson Co., Jackson, Mich.
- Pumps, Lubricant**
Ruthman Machinery Co., Cincinnati, Ohio
- Punch, Shear and Bender, Hand**
Armstrong-Blum Mfg. Co., 5741 Bloomingdale Ave., Chicago, Ill.
Buffalo Forge Co., Buffalo, N. Y.
- Punch Press Guards**
Ross Co., David J., Benton Harbor, Mich.
- Punches and Dies**
Lewthwaite Machine Co., 311 E. 47th St., New York, N. Y.
- Punches, Hand**
Armstrong-Blum Mfg. Co., 5741 Bloomingdale Ave., Chicago, Ill.
Buffalo Forge Company, Buffalo, N. Y.
Lewthwaite Machine Co., 311 E. 47th St., New York, N. Y.
Sampson Tool Co., 101 Walker St., New York
Whitney Metal Tool Co., Rockford, Ill.
- Punches, Hand and Power**
Ryerson & Son, Jos. T., 16th & Rockwell, Chgo.
- Punches, Multiple Power**
Reatty Mch. & Mfg. Co., Hammond, Ind.
- Punches, Transfer**
McMahon Co., Frank, Dayton, Ohio
- Punches and Shears, Comb.**
Ryerson & Son, Jos. T., 16th & Rockwell, Chgo.
- Pyrometers**
Ill. Test. Laboratories, 150 W. Austin, Chicago
- Quick Change Collets & Chucks**
Jarvis Co., Charles L., Middletown, Conn.
- Racks, Bar Stock**
Western Tool & Mfg. Co., Springfield, Ohio
Wm. S. Yohe Supply Co., Canton, Ohio
- Reamers**
Glenzer Co., J. C., Detroit, Mich.
Master Tool Co., Cleveland, Ohio
Renn Tool Company, Detroit, Mich.
- Rivets**
Hassall, Inc., John, Brooklyn, N. Y.
- Rivets, Tubular and Split**
Chicago Rivet & Machine Co., 1855 S. 54th St., Cicero, P. O. Chicago, Ill.
- Rivetters, Automatic Feed**
Chicago Rivet & Machine Co., 1855 S. 54th St., Cicero, P. O. Chicago, Ill.
Tomkins-Johnson Co., Jackson, Mich.
- Riveters, Multiple Spindle**
Grant Mfg. & Machine Co., Bridgeport, Conn.
- Riveters, Pneumatic**
Grant Mfg. & Machine Co., Bridgeport, Conn.
Hanna Engineering Works, 1763 Elston Ave., Chicago, Ill.
- Riveting Machines**
Buffalo Forge Co., Buffalo, N. Y.
Grant Mfg. & Machine Co., Bridgeport, Conn.
Hanna Engineering Works, 1763 Elston Ave., Chicago, Ill.
- Riveting Machines, Tubular and Split**
Chicago Rivet & Machine Co., 1855 S. 54th St., Cicero, P. O. Chicago, Ill.
- Rod Cutters**
Armstrong-Blum Mfg. Co., 5741 Bloomingdale Ave., Chicago, Ill.
Lewthwaite Machine Co., 311 E. 47th St., New York, N. Y.
- Rotary Tables**
Troyke, Alfred A., Cincinnati, O.
- Router Bits**
American Rotary Tools Co., 44 Whitehall St., New York, N. Y.
- Sanders**
Jarvis Co., Charles L., Middletown, Conn.
Mall Tool Co., 7742 S. Chicago Ave., Chicago, Ill.
Stanley Electric Tool Div., New Britain, Conn.
Stow Mfg. Company, Binghamton, N. Y.
- Saws**
Black Diamond Saw & Machine Works, Inc., Natick, Mass.
- Saws, Electric Hand**
Delta Mfg. Co., Milwaukee, Wis.
Mall Tool Co., 7742 S. Chicago Ave., Chicago, Ill.
Stanley Electric Tool Div., New Britain, Conn.
- Saws, Metal Cutting**
Racine Tool & Mch. Co., Racine, Wis.
Ryerson & Son, Jos. T., 16th & Rockwell, Chgo.
- Saws, Rotary Hack**
Stanley Electric Tool Div., New Britain, Conn.
- Saw Sharpening Machines**
Wardwell Manufacturing Co., Cleveland, Ohio
- Sawing Machines**
Continental Machine Specialties, Minneapolis
Delta Mfg. Co., Milwaukee, Wis.
Grob Brothers, Grafton, Wis.
- Scraping Machines, Hand & Pneumatic**
Anderson Bros. Mfg. Co., Rockford, Ill.
- Screw Drivers, Electric**
Cincinnati Electrical Tool Co., Cincinnati, O.
Haskins Co., R. G., 623 S. California, Chicago.
Jarvis Co., Charles L., Middletown, Conn.
Stanley Electric Tool Div., New Britain, Conn.
Stow Mfg. Company, Binghamton, N. Y.
- Screw Drivers, Hand (Phillips)**
Apex Mch. & Tool Co., Dayton, Ohio
- Screw Driver Bits (Phillips & slotted screws)**
Apex Mch. & Tool Co., Dayton, Ohio
- Screw Machine Parts**
Modern Collet & Machine Co., Ecorse, Mich.
Sutton Tool Company, Detroit, Mich.
- Screw Machine Products**
Economy Machine Products Co., 5207 Lawrence Ave., Chicago, Ill.
- Screw Machines, Automatic**
Brown & Sharpe Mfg. Co., Providence, R. I.
- Screws**
Hassall, Inc., John, Brooklyn, N. Y.
Strong, Carlisle & Hammond Co., Cleveland, O.
- Scissors**
Ford Motor Co., Johanson Div., Dearborn, Mich.
Starrett Co., L. S., Athol, Mass.

Buyers' Directory

Set Screws, Headless and Hollow
 Economy Machine Products Co., 5207 Lawrence Ave., Chicago, Ill.
Safety Socket Screw Corp., 4440 N. Knox Ave., Chicago, Ill.
Standard Pressed Steel Co., Jenkintown, Pa.
Triplex Screw Co., Cleveland, Ohio

Shafts, Flexible
 Huskins Co., R. G., 623 S. California, Chicago.
 Jarvis Co., Charles L., Middletown, Conn.
Mall Tool Co., 7742 S. Chicago Ave., Chicago, Ill.
 Pratt & Whitney, Hartford, Conn.
 Stow Mfg. Company, Binghamton, N. Y.
 Strand Co., N. A., 5001 N. Wolcott St., Chicago

Shafts, Hangers & Boxes
 Delta Mfg. Co., Milwaukee, Wis.

Shapers
 Atlas Press Co., Kalamazoo, Mich.

Shaper Attachments
 Fuchs Mch. & Supply Co., Omaha, Nebr.

Shaping Machines
 Osborne & Sexton Machinery Co., Columbus, O.

Shears, Bevel
 Marshalltown Mfg. Co., Marshalltown, Ia.

Shears, Hand
 Armstrong-Rlum Mfg. Co., 5741 Bloomingdale Ave., Chicago, Ill.
 Beverly Shear Co., 3007 W. 110th Pl., Chicago
 Lewthwaite Machine Co., 811 E. 47th St., New York, N. Y.
 National Machine Tool Co., Racine, Wis.
 Whitney Metal Tool Co., Rockford, Ill.

Shears, Power
 Beatty Mch. & Mfg. Co., Hammond, Ind.
 Buffalo Forge Co., Buffalo, N. Y.
 Dreis & Krump Mfg. Co., 7440 Loomis, Chicago
Libert Machine Co., Green Bay, Wis.
 Ryerson & Son, Jos. T., 16th & Rockwell, Chgo.
 Stanley Electric Tool Div., New Britain, Conn.

Shears, Slitting
 Beverly Shear Co., 3007 W. 110th Pl., Chicago
 Buffalo Forge Co., Buffalo, N. Y.
 Dreis & Krump Mfg. Co., 7400 Loomis, Chicago
 National Machine Tool Co., Racine, Wis.

Shears, Splitting
 Marshalltown Mfg. Co., Marshalltown, Ia.

Shears, Throatless
 Beverly Shear Co., 3007 W. 110th Pl., Chicago
 Marshalltown Mfg. Co., Marshalltown, Ia.
 Ryerson & Son, Jos. T., 16th & Rockwell, Chgo.

Sheet Metal Machinery
 Libert Machine Co., Green Bay, Wis.

Shims, Babbitt Tipped
 Laminated Shim Co., Inc., L. I. City, N. Y.

Shims, Laminated
 Laminated Shim Co., Inc., L. I. City, N. Y.

Shim Stock
 Laminated Shim Co., Inc., L. I. City, N. Y.

Sine Bars
 Ford Motor Co., Johansson Div., Dearborn, Mich.

Skids, Live
 All Steel Welded Truck Corp., Rockford, Ill.

Sleeves
 Glenzer Company, J. C., Detroit, Mich.

Socket Head Cap Screws
 Economy Machine Products Co., 5207 Lawrence Ave., Chicago, Ill.
Safety Socket Screw Corp., 4440 N. Knox Ave., Chicago, Ill.
 Standard Pressed Steel Co., Jenkintown, Pa.

Soldering Tools, Electric
 Ideal Commutator Dresser Co., Sycamore, Ill.

Spacing Collars
 Scully-Jones & Co., 1905 S. Rockwell St., Chicago, Ill.

Special Tools and Machinery
 American Tool Works, Inc., Hartford, Conn.
 Beatty Mch. & Mfg. Co., Hammond, Ind.

Speed Reducers
 Abart Gear & Mch. Co., 4832 W. 16th St., Chgo.
 Cullman Wheel Co., 1359 Altgeld St., Chicago

Speed Saws, Universal
 Wyzenbeck & Staff, Inc., 838 W. Hubbard, Chgo.

Spools & Nuts for Auto. Screw Machines
 Sutton Tool Co., Detroit, Mich.

Split Rivets
 Chicago Rivet & Machine Co., 1855 S. 54th St., Cicero, P. O. Chicago, Ill.

Split Rivet Setters, Automatic Feed
 Chicago Rivet & Machine Co., 1855 S. 54th St., Cicero, P. O. Chicago, Ill.

Spot Welding Machines, Speed
 Elsler Engineering Co., Inc., Newark, N. J.
 Interstate Machinery Co., Chicago, Ill.
 Pier Equipment Mfg. Co., Benton Harbor, Mich.

Sprockets
 Cullman Wheel Co., 1359 Altgeld St., Chicago

Stacking Boxes
 Pollard Bros. Mfg. Co., 5505 N.W. Hwy., Chgo.

Stake Riveters
 Marshalltown Mfg. Co., Marshalltown, Ia.

Stampings
 Hamilton Tool Co., Hamilton, Ohio

Steam Specialties
 Strong, Carlisle & Hammond Co., Cleveland, O.

Steel
 Ryerson & Son, Jos. T., 16th & Rockwell, Chgo.

Stools, Shop
 Standard Pressed Steel Co., Jenkintown, Pa.

Storage Racks
 Pollard Bros. Mfg. Co., 5505 N.W. Hwy., Chgo.
 Stackbin Corp., Providence, R. I.
 Yohe Supply Co., Canton, Ohio

Straightening Machines
 Whitney Metal Tool Co., Rockford, Ill.

Stripping Units
 Strippit Corp., Buffalo, N. Y.

Structural Shop Machinery
 Ryerson & Son, Jos. T., 16th & Rockwell, Chgo.

Stud Setters
 Apex Machine Co., Dayton, Ohio

Studs, Milled
 Safety Socket Screw Corp., 4440 N. Knox Ave., Chicago, Ill.

Tables, Elevating
 Midwest Tool & Engineer. Co., Dayton, Ohio

Tables, Spacing
 Beatty Mch. & Mfg. Co., Hammond, Ind.

Tap Extractors
 Walton Co., Hartford, Conn.

Tap Holders
 Procnier Safety Chuck Co., 14 S. Clinton St., Chicago, Ill.
 Scully-Jones & Co., 1905 S. Rockwell St., Chicago, Ill.

Tappers, Electric Portable
 Cincinnati Electrical Tool Co., Cincinnati, Ohio

Tapes, Steel
 Starrett Co., L. S., Athol, Mass.

Buyers' Directory

Tapping Machines and Attachments

Burke Machine Tool Co., Conneaut, Ohio
 Errington Mechanical Laboratories, Staten Island, N. Y.
 Ettes Tool Co., 594 Johnson Ave., Brooklyn, N. Y.
 Haskins Company, R. G., 623 S. California Ave., Chicago, Ill.
 Jarvis Co., Charles L., Middletown, Conn.
 Proconier Safety Chuck Co., 14 So. Clinton St., Chicago, Ill.
 Whitney Metal Tool Co., Rockford, Ill.

Thermometers, Resistance Type

Ill. Test. Lab., 150 W. Austin, Chicago

Threading Machines, Automatic

Grant Mfg. & Machine Co., Bridgeport, Conn.

Threading Tools

Armstrong Bros. Tool Co., 308 N. Francisco Ave., Chicago, Ill.
 Luers, Milton J., Detroit, Mich.
 Rivett Lathe & Grinder, Inc., Brighton, Boston

Timing Devices

Luers, Milton J., Detroit, Mich.

Tool Holders

Armstrong Bros. Tool Co., 308 N. Francisco Ave., Chicago, Ill.
 Michigan Tool Co., Detroit, Mich.
 Western Tool & Mfg. Co., Springfield, Ohio

Tool Post Grinders

Cincinnati Electrical Tool Co., Cincinnati, Ohio

Tool Post Turrets

Colwell, S. G., Providence, R. I.

Tool Reclaim. & Salvage

Eastern Cutter Salvage Corp., Newark, N. J.
 Master Tool Co., Cleveland, Ohio
 Renu Tool Company, Detroit, Mich.

Tools, Boring

Armstrong Bros. Tool Co., 308 N. Francisco Ave., Chicago, Ill.
 Comet Tools, Inc., 39 Union Square, New York

Tools, Cutting

Carboloy Co., Detroit, Mich.
 McKenna Metals Co., Latrobe, Pa.

Tools, Cutting (Kennametal)

McKenna Metals Co., Latrobe, Pa.

Tools, Lathe and Planer

Armstrong Bros. Tool Co., 308 N. Francisco Ave., Chicago, Ill.

Tools, Machinists'

Armstrong Bros. Tool Co., 308 N. Francisco Ave., Chicago, Ill.
 Brown & Sharpe Mfg. Co., Providence, R. I.
 Starrett Co., L. S., Athol, Mass.

Tools, Pneumatic and Main Parts

Eastern Cutter Salvage Corp., Newark, N. J.
 Master Tool Co., Cleveland, Ohio

Tracing Sheets

Wade Instrument Co., Cleveland, Ohio.

Tram Points

Ford Motor Co., Johansson Div., Dearborn, Mich.

Transmissions, Variable Speed

Ideal Commutator Dresser Co., Sycamore, Ill.

Trucks, Warehouse

Pollard Bros. Mfg. Co., 5505 N.W. Hwy., Chgo.

Tube Flanging Machines

Grant Mfg. & Mche. Co., Bridgeport, Conn.

Tubular Rivet Setters, Automatic Feed

Chicago Rivet & Machine Co., 1855 S. 54th St., Cicero, P. O. Chicago, Ill.

Tungsten Carbide Tools

Metal Carbides Corp., Youngstown, Ohio
 Michigan Tool Co., Detroit, Mich.
 Willey's Carbide Tool Co., Detroit, Mich.

Turning Machines, Crank Pin

Pedrick Tool & Mch. Co., Philadelphia, Pa.

Universal Joints

American Tool Works, Inc., Hartford, Conn.

Used and Rebuilt Machinery

Aaron Machinery Co., 176 Lafayette St., N. Y.
 Acme Equipment Co., 128 S. Clinton, Chicago.
 Atlas Equipment Co., 101 S. Clinton, Chicago.
 Belyea Company, Jersey City, N. J.
 Bennet-Rafkin Machine Tool Corp., 30 Church St., New York, N. Y.
 Bernstein & Co., Geo. M., 12 S. Clinton, Chgo.
 Botwinik Brothers, Inc., New Haven, Conn.
 Brown Machinery Co., St. Louis, Mo.
 F. W. Burns Mch. Co., Milwaukee, Wis.
 Cincinnati Machy. & Supply Co., Cincinnati, O.
 Clinton Machinery Co., 53 S. Clinton St., Chicago
 Daniels, C. E., Milwaukee, Wis.
 Dixie Mill Supply Co., New Orleans, La.
 Eastern Machinery Co., Cincinnati, Ohio
 Emerman, Louis E. & Co., 1761 Elston, Chicago
 Essley Machinery Co., E. L., 831 W. Evergreen Ave., Chicago, Ill.
 Falk Mill Supply Co., Inc., Rochester, N. Y.
 General Blower Co., 401 S. Peoria St., Chicago
 Goldman & Co., Harvey, Detroit, Mich.
 Grand Mch. Exchange, 140 Centre St., N.Y.C.
 Harris Elec. Supply Co., 546 W. Lake, Chgo.
 Hill, Clarke & Co., 645 W. Washington, Chgo.
 Hyman & Sons, Joseph, Philadelphia, Pa.
 Indianapolis Mch. & Supply Co., Indianapolis
 Industrial Machinery Co., Indianapolis, Ind.
 Inland Machinery Co., 41 S. Clinton, Chicago.
 International Machinery Co., Detroit, Mich.
 Interstate Machinery Co., 109 S. Clinton, Chgo.
 Iroquois Machinery Co., Buffalo, N. Y.
 Johnson & Sons Mch. Co., Wm. C., St. Louis
 Jones Machine Tool Co., Cincinnati, Ohio
 Klauber Machinery Co., St. Louis, Mo.
 Lake Machinery Co., 656 W. Lake, Chicago.
 Lang Machinery Co., Pittsburgh, Pa.
 Lowe Co., Chas. E., Hartford, Conn.
 Lucas & Son, J. L., Bridgeport, Conn.
 McDonald Machinery Co., St. Louis, Mo.
 Marr-Galbreath Mch. Co., Pittsburgh, Pa.
 Miles Machinery Co., 2025 Genesee Ave., Saginaw, Mich.
 Morey Machinery Co., Inc., 410 Broome St., New York, N. Y.
 Morris Machinery Company, Inc., Newark, N. J.
 Nelson Machinery Co., Green Bay, Wis.
 Norton-Broadway Machinery Co., Cincinnati, O.
 O'Brien Machinery Co., Philadelphia, Pa.
 Osborne & Sexton Machinery Co., Columbus, O.
 Ott Machinery Sales Co., Detroit, Mich.
 Passman Bros., 705 Washington, Chicago
 Reliance Machinery Sales Co., Pittsburgh, Pa.
 Reynolds Machinery, Providence, R. I.
 Rosenkranz & Weisbecker, 2300-A Singer Bldg., New York City
 Royal Mch. Exchange, 401 Broome, N.Y.C.
 Scott-Ramsbach Mch. Co., 4607 W. 20th, Chgo.
 Seegal Machinery Co., 117 S. Clinton St., Chicago
 Simmona Machine Tool Corp., Albany, N. Y.
 Standard Machinery Co., Grand Rapids, Mich.
 Strong, Carlisle & Hammond Co., Cleveland, O.
 Surplus Stock & Mch. Co., Inc., 618 W. Lake St., Chicago, Ill.
 United Machinery & Supply Co., St. Louis, Mo.

Buyers' Directory

Used and Rebuilt Machinery—Cont.

Victor Machinery Co., 130 S. Clinton, Chicago
 Victor Machinery Exchange, 251 Centre St.,
 New York, N. Y.
 Vine, R. A., Detroit, Mich.
 Weiss Machine Co., Angola, Ind.
 West Penn Machinery Co., Pittsburgh, Pa.
 White Mch. Co., A. D., 108 N. Jefferson, Chgo.
 Wigglesworth Machinery Co., Cambridge, Mass.
 Wisconsin Gear & Eng. Co., Milwaukee, Wis.

Vacuum Cleaners, Industrial

Breuer Elec. Mfg. Co., 5108 N. Ravenswood,
 Chicago

Vacuum Cleaners, Portable

Breuer Elec. Mfg. Co., 5108 N. Ravenswood,
 Chicago

Valves

Berkeley Engineering Co., Cleveland, Ohio
 Galland-Henning Mfg. Co., Milwaukee, Wis.
 Hanna Engineering Works, 1763 Elston, Chicago

Valves, Air

Air-Way Pump & Equip. Co., 625 Jackson, Chgo.
 Bell Machine Co., Oshkosh, Wis.
 Berkeley Engineering Co., Cleveland, Ohio
 Galland-Henning Mfg. Co., Milwaukee, Wis.
 Hanna Engineering Works, 1763 Elston, Chicago
 Logansport Machine, Inc., Logansport, Ind.
 Nicholson & Co., Wilkes-Barre, Penna.
 Tompkins-Johnson Co., Jackson, Mich.

Valves, Auto. Self-Opening

Bell Machine Co., Oshkosh, Wis.

Valves, Foot, Lever & Solenoid

Berkeley Engineering Co., Cleveland, Ohio
 Hanna Engineering Works, 1763 Elston, Chicago
 Nicholson & Co., W. H., Wilkes-Barre, Pa.

Valves, Hydraulic

Berkeley Engineering Co., Cleveland, Ohio
 Galland-Henning Mfg. Co., Milwaukee, Wis.
 Hanna Engineering Works, 1763 Elston, Chicago
 Nicholson & Co., Wilkes-Barre, Penna.

Valves, Operating

Berkeley Engineering Co., Cleveland, Ohio
 Galland-Henning Mfg. Co., Milwaukee, Wis.
 Hanna Engineering Works, 1763 Elston, Chicago
 Nicholson & Co., W. H., Wilkes-Barre, Pa.

Vises, Drilling Machine

Armstrong-Blum Mfg. Co., 5741 Bloomingdale
 Ave., Chicago
 Armstrong Bros. Tool Co., 308 N. Francisco Av.,
 Chicago, Ill.
 Johnson Tool Co., Inc., East Providence, R. I.
 Knu-Vise Products Co., Detroit, Mich.
 L-W Chuck Co., Toledo, Ohio
 Martin Tool & Die Works, Springfield, Ohio
 National Machine Tool Co., Racine, Wis.
 Odin Univ. Corp., 110 S. Dearborn, Chicago
 Plunket Machine Co., 1823 W. Lake St., Chicago
 Sampson Tool Co., 101 Walker St., New York

Vises, Machinists'

Desmond-Stephan Mfg. Co., Urbana, Ohio
 L-W Chuck Co., Toledo, Ohio
 Odin Univ. Corp., 110 S. Dearborn, Chicago
 Western Tool & Mfg. Co., Springfield, Ohio

Vises, Milling Machine

Hartford Special Mch. Co., Hartford, Conn.
 Knu-Vise Products Co., Detroit, Mich.
 L-W Chuck Co., Toledo, Ohio
 Odin Univ. Corp., 110 S. Dearborn, Chicago
 Plunket Machine Co., 1823 W. Lake St., Chicago

Vises, Precision

Odin Univ. Corp., 110 S. Dearborn, Chicago

Vises, Shaper

L-W Chuck Co., Toledo, Ohio
 Odin Univ. Corp., 110 S. Dearborn, Chicago
 Plunket Machine Co., 1823 W. Lake St., Chicago

Welders, Arc

Chicago Electric Co., 1330 W. Cermak Rd., Chgo.
 Fuchs Mch. & Supply Co., Omaha, Nebr.
 Hobart Brothers, Troy, Ohio
 Lincoln Electric Co., Cleveland, Ohio
 Pier Equipment Mfg. Co., Benton Harbor, Mich.

Welders, Arc, Diesel Driven

Lincoln Electric Co., Cleveland, Ohio

Welders, Automatic, A. C.

Lincoln Electric Co., Cleveland, Ohio

Welders, Arc, Engine Driven

Lincoln Electric Co., Cleveland, Ohio

Welders, Portable

Chicago Electric Co., 1330 W. Cermak Rd., Chgo.
 Hobart Brothers, Troy, Ohio
 Lincoln Electric Co., Cleveland, Ohio

Welding Accessories

Hobart Brothers, Troy, Ohio
 Lincoln Electric Co., Cleveland, Ohio

Welding Electrodes and Holders

Hobart Brothers, Troy, Ohio
 Lincoln Electric Co., Cleveland, Ohio

Welding Generators, Arc

Chicago Electric Co., 1330 W. Cermak Rd., Chgo.
 Hobart Brothers, Troy, Ohio
 Lincoln Electric Co., Cleveland, Ohio

Welding Machines, Electric Spot

Eisler Engineering Co., Inc., Newark, N. J.
 Interstate Machinery Co., Chicago, Ill.
 Pier Equipment Mfg. Co., Benton Harbor, Mich.

Welding Machines and Equipment, E. I. Arc

Hobart Brothers, Troy, Ohio
 Pier Equipment Mfg. Co., Benton Harbor, Mich.

Welding Machines, Resistance

Eisler Engineering Co., Inc., Newark, N. J.
 Pier Equipment Mfg. Co., Benton Harbor, Mich.

Welding Protective Equipment

Lincoln Electric Co., Cleveland, Ohio

Wire Working Equipment

Sleeper & Hartley, Inc., Worcester, Mass.

Wire Working Machinery

Sleeper & Hartley, Inc., Worcester, Mass.

Woodworking Machinery

Tannewitz Works, Grand Rapids, Mich.

Wrenches, Socket, Plain

Apex Mch. & Tool Co., Dayton, Ohio

Wrenches, Socket, Univ. Joint Type

Apex Mch. & Tool Co., Dayton, Ohio

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Press, American Can, 150 ton, coining. 695

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Miller, No. 3 B Milwaukee.
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Hammers, Little Giant 25 lb.; Beaudry 50 lb., b. d.
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Grinder, No. 2 Greenfield universal tool and cutter.
Grinder, No. 2 Brown & Sharpe surface, motor drive.
Miller, No. 4 Cincinnati, plain, cone.
Miller, No. 5 H. & S., plain, table 16" x 54", cone.
Planer, 36" x 26" 1/2" Cincinnati, 2 heads.
Press, No. 6 Toledo, o. b. l., 5 1/2" stroke.
Press, No. 58 Toledo geared, 3" shaft 8" stroke, high
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Milling Machine, No. 3 Van Norman S. P. D.
Pipe cutting and threading machine 6" Merrill.
Planer, Cincinnati 36" x 36" x 10' table.
Press, No. 20 Bliss o. b. i. m. d. with motor.
Saw, hack, Racine 9' x 9", m. d.
Shaper, 24" Gould & Eberhardt.
Shear, a ligator, United, cap. 5" square.
Shear, plate, L. & A. cap. 62" x 4".
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Automatic screw machine, Brown & Sharpe,
No. 19 high speed, with motor. 300
Automatic screw machine, Davenport, 4", 5 spdl.,
belt drive. 450 to 500
Automatic screw machine, Cleveland, Model A &
B 4" to 14" belt drive. 250 to 450
Automatic screw mch., Cleveland 7 1/2" Model A
belt drive, 13964. 2500
Auto. screw machine, Gridley, 9/16" 4" and 1 1/2"
model F & G. 8225 to 450
Auto. screw machine, Gridley, 3 1/2" single spindle
Miller, No. 0, Bristol, hand, 14" x 4 1/2" x 14". 135
Miller, No. 1A Milwaukee, g. h. cap. 22" x 8" x 19". 600
Miller, No. 10B Milw., g. h., cap. 28" x 10" x 19". 600
Miller, No. 28 Ohio, plain, b. d., 28x10x13, vise. 600
Motor, 20 h. p. G. E., 220 volt, 60 cy., 3 ph., 1145
r. p. m., complete. 175
Pipe machine, No. 308 Oster, 2 1/2" to 8", belt dr. 400
Planer, 24x24x6 Ohio heavy duty, 1 head. 350
Planer, 72x72x12 Gray, 4 heads. 1,350
Press, 25 ton Henry-Wright, dieing, with roll
feeds, belt drive. 750
Press, 25 ton Henry-Wright, dieing, without roll
feeds, belt drive. 350
Press, No. 15 Robinson, horn type with table
and motor, a. c., 220 volt. 250
Press, No. 51 Toledo arch, 24" str., 56 t., 5300 lbs. 350
Press, Waterbury Farrell, straight sided, geared,
8" stroke, 30 ton, 16" between. 450
Press, DG56, Ferracute, tog., 4 1/2" & 9" str., 100 t. 1000
Press, Hercules, 15 ton, power forging or broach-

ing, motor drive. 200
Punch, shear & bender, No. 23 Armstrong-Hum. 75
Punch & shear, No. 52 Beloit comb. b. d., 1650 lbs. 175
Punch, Kneeland, 10" throat, shears 5" x 1" flats. 150
Riveter, No. 14B, High Speed Hammer, capacity
1 1/2", motor shelf. 100
Riveter, No. 3A, High Speed Hammer, capacity
1 1/2", with 1 1/2" h. p. motor, 220-60-3. 200
Riveter No. 5A, High Speed Hammer, cap. 1 1/2",
motor shelf. 275
Riveter, Grant No. 82, 101A, 61 & 80, cap. 1 1/2"
5/16", belt drive. 50 to 125
Roll feed, double, 5 1/2" stock, 2" str., from No. 21
Bliss press. 75
Saw, Cochran & Hly cold metal, 4" capacity. 50
Saw, No. 2 Klem, band, for metal cutting, b. d. 200
Screw machine, Acme, plain head, 1 1/2" x 4" b. d. 125
Screw machine, B. & S., No. 1 plain head, 1 1/2" x 3",
belt drive. 200
Screw machine, Foster, No. 5 geared hd., 1 1/2" x 8",
power feed, s.p.d. 500
Screw machine, S & K, No. 4, friction hd., 1 1/2" x 8"
belt drive. 250
Screw machine, Garvin, No. 3, friction head,
1 1/2" x 7", belt drive. 150
Separator, McKinnis, for chips, blower type,
belt or motor. 250
Separator, American, cap. 1 1/2 bushels, belt drive 250
Shaper, 16" Smith & Mills, back geared, crank,
vise and countershaft. 275
Shaper, 20" American, back geared, crank, vise
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FOR SALE BY

Belyea Company, Inc.
50 Howell Street, Jersey City, N. J.

GUARANTEED electric motors, generators, m. g. sets, transformers, frequency changers, gas eng. sets, rotary converters, centrifugal pumps, condensers, starting equipment. All sizes. Largest stock in the East. Prompt delivery. We also buy and exchange.

FOR SALE BY

General Blower Company
401 N. Peoria St., Chicago, Ill.

BLOWERS—FANS—EXHAUSTERS.

For Dust Collecting—Ventilating.
Oil and gas burners, cupolas, furnaces, etc.
Roots—Connersville and centrifugal blowers.
What are your blower requirements?

FOR SALE BY

Lang Machinery Company

28th St. & A. V. R. R.

Pittsburg, Pa.

Air compressors, (2) Sullivan, 480 c. f. 100 lb. b. m. d.
Air compressor, 6" x6" Gardner, b. d. \$100.
Air compressor, 6" x6" x4" Bury BUC, 13 c. f., 250 lbs.
Automatic, No. 9 Brown & Sharpe belt drive.
Automatic, No. 52 National Acme 4-spdl. cap. 4" b. d.
Automatic, model M C Cleveland, 4 spdl. 1" motor drive.
Bender, No. 519 Kane & Roach, 4" rd. motor drive.
Bolt cutter, 1" Landis, 14"-3" Acme, sgl. hnd., b. d.
Boring mill, 24" Bullard, rapid prod., s. p. d.
Boring mill, 30" Bullard, threading attach., s. p. d.
Boring mill, 36" Bullard, rapid prod., s. p. d.
Boring mill, 42" Gisholt, 2 hds., r. p. t., m. d.
Boring mill, 54" Bullard, rapid prod., s. p. d.
Boring mill, hor. 24" B. Lucas, tie type., b. d.
Boring mill, hor. 30" B. Lucas, high column, m. d.
Boring mill, hor. 36" Bement-Miles, floor type, m. d.
Borer, port., N. B. P. Duplex, 44" bars, m. d.
Blower, No. 5 B. F. Sturtevant, 8" dis. \$ 35.
Brakes, pwr., 7" 10 ga., 8" 12 ga., 10" 10 ga.
Brake, press type, 8" x20 ga. Vulcan, b. d.
Buffer and polisher, 74 h. p. Marschke, 220/360.
Drill, heavy duty No. 1 Baker, 24" capacity 24", s. p. d.
Drills, radial, 24" Cincinnati-Bickford, t. a., m. d.
Drills, upright, 14" to 32", belt drive.
Drill, 4 spindle No. 2 Foote-Burt, cap. 13" m. d.
Gear cutter, 48" Gould & Eberhardt, s. p. d.
Gear millers, No. 1 Bilton, capacity 4" belt drive.
Grinder, centerless, Heim, capacity 1", o. d.
Grinder, disc, 18" Diamond, dbl. end. \$135.
Grinder, surface, No. 2 Reid, 14" x6", belt drive.
Grinder, surface, 12" Pratt & Whitney vertical, m. d.
Hammer, 100 lb. Bradley cushion helve belt drive.
Keyseaters, No. 2 Baker, 32", belt drive.
Keyseater, No. 4 Mitts & Merrill capacity 24" b. d.
Keyseater, No. 5 Baker, 36" str., cap. 4" m. d.
Lathe, 14" x8" Hendey, tie bar, c. g. t. a., b. d.
Lathe, 16" x6" American high duty, c. g. t. a., b. d.
Lathe, 19" x10" LeBlond, grd. hd., t. a., m. d.
Lathes, 20" x9" Lehmann, geared head, s. p. d.
Lathe, 20" x24" LeBlond & Shipley, c. g. t. a., b. d.
Lathe, 21" x8" LeBlond, grd. hnd., t. a., m. d.
Lathe, 24" x10" Bradford, p. c. g. t. a., b. d. \$450.
Lathe, 24" x16" Lodge & Shipley, c. g. t. a., m. d.
Lathe, 24" x16" LeBlond, c. g. t. a., b. g., chk. t. a., b. d.
Lathe, 26" x12" Bridgeford, c. g. d. b. g., b. d. \$450.
Lathe, 26" x16" Bridgeford, grd. head, m. d.
Lathe, 24" x10" Schumacher & Hoye, c. g. t. a., b. d. \$500.
Lathe, 36" x16" N. B. P. c. g. t. a., b. d.
Lathe, 40" x40" H. & G. geared head, m. d.
Lathe, 51" x32" New Haven, triple geared, motor drive.
Lathe, roll, 54" x24" Standard, motor drive.

Lathe, turret, No. 2-A Warner & Swasey, s. p. d.
Lathe, turret, 24" Steine, 64" h. spdl., m. d. \$400.
Miller, duplex, No. 3 Van Norman, s. p. d.
Miller, Lincoln type, No. 4 Hendey, c. g. c. \$200.
Miller, plain, No. 1 Kempsmith, 42" x10", belt drive.
Miller, plain, No. 2 Cincinnati, tbl. 48" x10", b. d.
Miller, plain, No. 24 LeBlond, tbl. 52" x11-8", b. d. \$375.
Miller, plain No. 25 Ohio, table 52" x11-4", belt drive.
Miller, plain, No. 3 Cincinnati, b. d. \$375.
Miller, plain No. 4 LeBlond, table 72" x16", belt drive.
Miller, plain, No. 24 Brown & S. tbl. 80" x17-8", b. d. \$750.
Miller, universal No. 2B Hendey tbl. 45" x10", b. d.
Miller, univ. No. 3 Cincinnati, tbl. 12" x51", b. d.
Model, vertical, model "B" Becker drill, 67" stock, s. p. d.
Pipe machines, Landis 14" to 32", belt drive, (2).
Pipe, machine, Standard, 4"-3", b. d. \$175.
Pipe machine, No. 304-B Oster, 1" to 4", motor drive.
Pipe machine, 8" Williams, 24" to 8" motor drive.
Pipe machine, No. 114 Merrill, 24" to 12", motor drive.
Planer, 36" x36" x10" Gray, 1 head, m. d.
Planers, 36" x36" x10" Cincinnati, 2 heads, belt drive.
Press, arch, No. 52 Toledo, str. 44", m. d.
Press, double acting, No. 1 Bliss, belt drive.
Presses, No. 5 Blissstiles type, bed 17" x20", str. 2", b. d.
Press, No. 95 Bliss, dbl. crk., str. 34", m. d.
Press, No. 93 Toledo, dbl. crk., str. 3", m. d.
Press, trimming, No. 12 Erie, bed 26", str. 54", side sh.
Press, wheel, 100-ton Caldwell, 36" x26", b. d.
Press, wheel 200-ton Niles, 48" x108", b. d.
Press, wheel, 200-ton Hydro Press Co., b. d.
Profilers, Nos. E3 and E4, Keller, motor drive.
Punch & shear, "C" Cleveland 13/16" x3" belt drive.
Punch and shear, Cleveland "G", 2", 1", 48" throat.
Riveting hammer, No. 54B high speed, m. d.
Rolls, angle, Kane & Roach 2" x2" x4", motor drive.
Saw, band, metal, 12" Laidlaw, b. d. \$175.
Saw, hack, No. 5 Marvel, 6" x6", belt drive.
Saw, hack, No. 7 Atkins, 8" x8", motor drive.
Saw, hack, 8" x30" Racine, m. d.
Saws, hack, 12" x12" Racine, single pulley drive.
Shapers, 16" to 32", belt or motor drive.
Shear, rotary, No. 10 Quickwork, 14 ga. 60" throat.
Shear, rotary, Lennox, 8" x42" throat, b. d.
Shear, square 38" x16" Niagara motor drive.
Shear, squaring No. 242 Niagara, 42" x14 ga. m. d.
Slotter, 8" Betts, table 20" dia. b. d.
Straightener, No. 1 Kane & Roach cap. 3" rd. m. d.
Straightener, pipe, 8" Woodward, vertical, m. d.
Straightener, 14" x4" F. Schuster, belt drive. \$450.
Welder, arc 300 amp. Lincoln, d. c. or a. c.

USED AND REBUILT MACHINERY

FOR SALE BY

Faylor-Strafer Machinery Co.

136 Liberty St., - - New York, N. Y.

Bolt cutter, 2" Landis double head, motor drive.
 Brakes, Ohl Power Press, 10' x 10 ga.
 Crane, 10 ton Niles, 37" span, 4 c. motors.
 Grinder, No. 14 Pratt & Whitney, b. d., vert. surface.
 Grinder, No. 16 B. anard high power vert. sur., m. d.
 Lathe, 25" x 14' Bridgeford, geared head, m. d., taper.
 Lathe, 45" x 34' Bridgeford geared head, motor drive.
 Lathe, turret 3" x 36" J. & L., bar and chucking equip.
 Miller, Becker, duplex Lincoln type.
 Miller, Brown & Sharpe No. 24 plain, 72" table.
 Miller, Brown & Sharpe No. 5 vert., pwr. rot. table.
 Table, circular, 42" mounted on base with cross adjust.
 Spot welder, Thompson, 67 k. v. a.

FOR SALE BY

Segal Machinery Company

117 S. Clinton St., - Chicago, Ill.

Air compressors, 10x10 Inger-Rand, Class E. R. 1.
 Boring mill, 42" Builard, two heads on rail.
 Radial drills, 4" Gen Rad., motor-in-head.
 5' Niles-Bement-Pond, single pulley dr.
 Lathes, 18x5 Sebastian, motor in base, c. c. g.
 24x12' Milwaukee, semi-c. c. g. taper attachment.
 24x18 Lodge & S—geared hd., c. c. g., tap. att.
 Millers, No. 4B Becker vertical, power feed.
 No. 2 Kempsmith universal, dividing head.
 Screw machines, 14" American universal, geared head.
 I-B Foster universal, s. p. d., geared head.
 Shaper, 20" G. & E., hi-duty, 23" American b. g.
 Partial list - Send us your inquiries.

FOR SALE BY

West Penn Machinery Company

1210 House Building,

Pittsburg, Pa.

Air compressors, 30 to 2500 cubic feet.
 Automatic National Acme 1" C" 9/16, m. d. 220/3/60.
 Blower, No. 4 Roots, capacity 2110 c. f. m.
 Bolt cutters, 2" & 3" Acme, b. d.
 Boring mill, 42" King, belt drive.
 Boring mill, 64" Betts, 2 heads, belt drive.
 Boring mill, hor. 34" Rockford m. d. 220/3/60.
 Bulldozers, Nos. 2, 4, 6, 9, 28, & 30.
 Crane, 10 ton Whiting, 43" Span, 220 d. c.
 Crane, 20 ton Northern, 47 1/2" span, 220 v. d. c.
 Drill, radial 5' Cincinnati-Rickford, motor drive 220 d. c.
 Drill, radial 6' Keck-Prentice, single pulley drive.
 Drills, 4 spindle Allen, No. 2 m. t., s. p. d.
 Drill, multiple 25 spindle No. 30 Natick.
 Drills, upright 10" to 36".
 Engine, gas, 20 horse power Bessemer.
 Flanger, McCabe, 4" capacity, dies.
 Flanger, No. 208 Niagara, 10 Ga. b. d.
 Gear cutter, No. 5 Brown & Sharpe, 60x11 motor drive.
 Gear cutters, 11", 18" & 24" Gleason.
 Gear tester, bevel 18" Gleason.
 Grinder, centerless, No. 2 Cincinnati m. d. 220/3/60.
 Grinder, drill, No. 31 Oliver, 14", m. d., 220/3/60.
 Grinder, knife 10' Bridgeport, m. d.
 Grinder, roll, Farrell 28" x 76".
 Grinders, D. E. 2-3 & 5 h. p., 220/3/60.
 Grinder, tool & cutter, No. 11 Cinc., m. d.
 Grinder, disc, No. 8-20 Besly, belt drive.
 Grinder, disc, No. 4 Gardner, motor drive, 220/3/60.
 Grinder, Gisholt tool and cutter, motor drive, 220/3/60.
 Groover, No. 275-A Niagara, 6', 16 ga. motor drive.
 Hammer, power, 50-lbs. Blacker.
 Hammer, power, 90-lb. upright, belt drive.
 Hammer, power, 100 lb. Bradley cushion helve.
 Hammer 200 lb. Bradley upright, b. d.
 Hammers, Nos. 2-B, 3-B, 4-B, 5-B, Nasel.
 Hammers, steam, forging & drop.
 Hoist, 1 ton Shepherd 220-V. direct current.
 Keyseater, No. 2 Mitis & Merrill, belt drive.
 Ladles, 20 ton Whiting, top pour.
 Lathe, 20x10 geared head Schellenbach, s. p. d.
 Lathe, 22" x 12" L-K quick change gear, d. b. g.
 Lathe, 24x12 Lodge & Shipley, c. c. g., d. b. g., t. a.
 Lathe, 24" x 15" Prentice, geared head s. p. d., t. a.
 Lathe, 42" x 18" Schumacher Hoye, c. c. g., belt drive.
 Lathe, spinning 32" belt drive.
 Lathe, turret, W&S No. 2A & No. 3A s. p. d.
 Lathe, turret, 24x36 Acme, s. p. d.
 Lathe, turret, 17x36 LeBlond double back gear 14".
 Miller, hand, No. 1 U. S., b. d.
 Miller, vertical No. 2 Knight, b. d.
 Miller, vertical No. 6 Becker, motor drive.
 Mixers, Sprout-Waldron, batch & liquid.
 Pipe machine, 2" Landis, belt drive.
 Pipe machine, 4" Oster 220-3-60 motor drive.
 Pipe mach, 2", 6", 8", 12" Williams, motor drive,

Pipe machine, 8" Landis, motor drive.
 Planer, 36x36x10' Cincinnati belt drive.
 Planer, 42x42x12' Cincinnati, 3 heads, belt drive.
 Planer, 60x60x20' Pond motor drive.
 Press, wheel 150 ton Caldwell, 42", b. d.
 Press, hydraulic 100-ton Southwark.
 Press, boring 42-A Toledo belt drive.
 Press, 19 Bliss open back inclinable, 3" stroke.
 Press, No. 55 Toledo, bed 20x19.
 Press, No. 58 Toledo, 8" stroke.
 Press, No. 74 Bliss, 8" stroke.
 Press, 19 Bliss, 12" stroke T. R.
 Press, double crank No. 5 Bliss, 2" stroke, b. d.
 Press, gap, No. 74 Bliss consolidated 44" stroke.
 Press, screw, No. 87 Niagara, hand power.
 Press, 6 spindle, Waterbury-Farrell.
 Press, toggle, 10'-16 ga. Robinson, b. d.
 Press, arch, No. 38 Bliss, roll feed, b. d.
 Press, strip feed, McDonald No. 38A & 31E.
 Punch, 25" Cleveland, 36" throat, 14" thru 1".
 Punch, beam 11" Cleveland, 24", m. d.
 Pumps, centrifugal 6", 4", 1", motor drive.
 Riveters, air, hammer, spinning.
 Rolls, angle, Niagara 14x14x4".
 Rolls, angle, Buffalo, 4x4x4", motor drive.
 Rolls, plate 10x4 H. & J., motor drive.
 Rolling mill, cold 9" x 18" motor drive.
 Saw, friction, Nos. 2, 3 & 4 Ryerson motor drive.
 Saw, cold, 48" Newton motor drive.
 Saw, hick, Peerless, 6x6, 220-3-60.
 Shaper, 16", 20", 24" & 36" Gould & Eberhardt.
 Shears, alligator, 14", 2", 3", 4" & 6".
 Shear, Angle 6x6x4 Long & Allstatter, m. d.
 Shear, circle, Niagara, 4" cutters, 16 ga.
 Shear, circle No. 3 Bliss, 40" x 20 gauge.
 Shear, squaring No. 48 Excello 14 ga. bis. 53".
 Shear, 10' x 4" Bliss, hold-down, b. d.
 Shear, plate, 60" x 14" Pels.
 Shear, 36" & 42" Niagara, 16 ga. b. d.
 Shear, rotary 24" throat capacity 8", m. d. 220/3/60.
 Shear, throatless, 4" Marshallton, motor drive.
 Slitter, gang, 36" Yoder motor drive.
 Slitter, gang, 36" Bradock, belt drive.
 Slotters, 6" & 24" Newton.
 Straightener, AS & TP 12"x3/16", belt drive.
 Straightener, 42" Actna std. 17 roll 24" m. d. 220/3/60.
 Straightener, 48" Actna-Standard, 17 roll 34" m. d.
 Straightener, No. 2 K. & R., 14" square, m. d.
 Straightener, No. 5 K. & R., 24" square belt drive.
 Tumbling barrel, 34" x 45", belt drive.
 Thread roller, No. 7 W-F, capacity 14".
 Thread roller, No. 261 V. & O., 4", belt drive.
 Unsetters, 1" to 6".
 Welder, spot 13 k. v. a. Taylor.
 Welder, butt 14" Winfield.
 Welders, arc, 200 & 300 amp. Lincoln.

USED AND REBUILT MACHINERY

FOR SALE BY

**Wigglesworth Machinery Co.
199 Bent Street Cambridge, Mass.**

Boring mill, No. 21 Lucas horizontal.
Boring mill, 24" bar Cleveland.
Grinder, No. 3V Galmeyer Livingston, hyd. surface.
Grinder, No. 16" Bilsland 26" chuck.
Lathe, 18"x10" Monarch, timken bearing.
Lathe, turret, No. 4 W. & S., timken bearings, (4).
Miller, No. 3 Cincinnati universal, hi power, rect. arm.
Send for Complete Stock List.

FOR SALE BY

Nelson Machinery Co., Green Bay, Wis.

Boilers: 300 HP Heine WT, 50 to 150 HP HRT'S.
Compressor, Ingersoll Rand 12x10 class ER-1, with
Idler, unloader, and 50 HP SI. R. mtr. and control.
Generators, 200 k. w. Westinghouse, 3-60-2200-514
beltd, with field rheostats (2).
Grinder, No. 11 Cochrane-Bly auto. saw sharpener,
capacity 32".
Motor, 30 h. p., G. E. vertical KT 336, 3-60-440-1150.
Planer, 30x30x8" Gray, beltd drive, single head.

FOR SALE BY

Marr-Galbreath Machinery Company

Air Comp., 24"x4" duplex, 31 c. f. m.
Air compressors, 42"x4" Gardner-Rix vertical, (2).
Blower, No. 2 Knight, 24" outlet m. d. Premix.
Blower, Premix No. 3 Knight, 24" outlet m. d.
Blower, Premix maxon, 5" outlet, 2 h. p., motor.
Blower, No. 3-D Crowell rot. pres., 14.4 c. f. m.
Boring mill, 42" Bullard vert. p. r. t., m. d.
Boring mill, 30" Bullard vert. threading attach., b. d.
Boring mill, 30" Colburn, vert., turret head.
Brake, 8"x12 g. Chicago, power.
Brake, toggle, 10"x16 g. Keene.
Drill, radial, 30" Rockford, g. b. m. d.
Crane and hoist, No. 1 Canton, 2000 lb. cap.
Crusher, 30"x30" Jeffrey, 1-roll.
Drill, 30" radial, No. 101 Canedy-Otto.
Drill, 3" radial, Dresser rd. swing table, t. a.
Drills, gang, 3 and 4 spindle, 1 to 4 MT.
Exhauster, No. 35 Buffalo, outlet 12"x14", m. d.
Fan, ventilating, 24" American, m. d., 1/60.
Fan, 24" Sirocco, 4560 cfm., 4" wp., m. d.
Forging machine, 18" Acme, all steel, side shear.
Forging mach., 3" & 5" National, m. d.
Furnace, gas fired, Tate-Jones "GOF", I. D. 16"x11".
Furnace, T. J., 25x23x12" I. D., 17000 ft.
Geom. dies for 4-C. head, 100 sets and, siz. up to 13/16".
Grinder, disc, No. 2 Gardner, 5 h. p. motor.
Grinder, U. S., "MM", 3 h. p., d. c. motor.
Grinder, portable surface, No. 6-OA, U. S. motor.
Grinder, plain, 6"x30" Landis, s. p. d.
Grinder, plain, 10"x36" Landis, s. p. d.
Grinder, univ. C. & R. No. 3 B. & S., m. d.
Hammer, 50 lb. Boss, No. 2, with dies beltd.
Hammer, 400 lb. Bliss board drop (rebuild).
Keyseat miller, No. 4 Burr., cap. 44".
Keyseater, No. 3 M. & M., 24" Morton.
Lathe, 7x30", Dalton, type B-4, screw cutting.
Lathe, 12"x8" Sebastian, g. d. h. q. c. g. m. d.
Lathe, 15"x8" Sebastian, g. d. g. motor-in-base.
Lathe, 16"x10" Carroll, q. c. g. d. b. g., 1-3/16" h. z.
Lathe, 20"x10" Morris, geared head, t. a., s. p. d.
Lathe, 20"x12" American geared head, m. d.
Lathe, 22"x12" Rahn-Larmon, pl. change gears, t. a.
Lathe, 26"x10" Wolcott, q. c. g. d. b. g., 2 1/2" h. z.
Lathe, 36"x16" N-B-P, geared head, m. d.
Marking machine, No. 3 Noble & Westbrook.

FOR SALE BY

**The E. L. Esley Machinery Co.
631 W. Evergreen Ave., Chicago, Ill.**

Automatics, Nos. 0G, No. 0, B. & S.
Miller, No. 2H LeBlond plain.
Miller, No. 2 Kemp Smith Maxi, pl., m. d.
Miller, No. 24 Rockford, gw., gw.
Shears, Lewis alligator, 3" and 5" cap., m. d., (2).

FOR SALE BY

**Rosenkranz, Weisbecker & Company, Inc.
2308 Singer Building, New York, N. Y.**

Boring mills, 5" & 64" bar Detrick & Harvey, m. d.
Boring mill, 60" Gisholt, rapid traverse, motor drive.
Drill, multiple apdl., No. 30 Natco, m. d., 20" round hd.
Grinder, 26"x120" Landis, plain, cylindrical, m. d.
Grinder, Cincinnati 24", face mill, motor drive.
Keyseaters, No. 3 Baker and No. 20 Catlin, m. d.
Lathe, 72"x40" Putnam, geared head, motor drive.
Lathe, 64"x25" Gleason, motor drive.
Lathe, 42"x18" Pittsburgh, quick change gear.
Planer, 72" Morton draw-cut traveling bed, arranged
for boring, milling and drilling, motor drive.
Planer, 72"x72"x16" Cincinnati, 4 heads, m. d.

57 Water St.,

Pittsburgh, Pa.

Miller, plain, No. 4 Ohio, range, 72x30x20".
Miller, plain, No. 6 Steptoe, index head, vise.
Miller, vertical, No. 3 Becker, table 28x10".
Milling mach. univ. No. 3 Kemp Smith, cone.
Milling machine, univ. No. 4 B. & S. cone.
Milling machine, pl. No. 3 Cincinnati, cone.
Nailing machine, No. 6 Morgan, 8-track, m. d.
Nut runner, No. 4 B. & S. D., motor 110 v.
Pinion cutter, No. 3 Sloan & Chase, capacity 1x1".
Pipe machine, 2" Landis pipe and nipple, motor.
Pipe machine, 24" Landis, dbl. head, g. b., m. d.
Pipe machine, 4" Williams, cap. 4" to 4", m. d.
Pipe machine, 18" Wieland "Standard", m. d.
Planer, 30"x30"x8" Cincinnati, 1-rail, 1-s. h., m. d.
Planer, 36"x36"x10" Liberty, 2-heads, m. d.
Plating m. g. sets, 1000, 3000 and 6000 amps.
Press, No. 21 Bliss, 1" stroke, for roll feed, m. d.
Press, No. 24 Niagara plain, 2" stroke.
Press, arch No. 3 Mossberg, pl., 14" str.
Press, dbl. crank, 95-E Toledo, str. 10", m. d.
Press, horn, No. 16 Bliss pl., 14" str., m. d.
Press, o. b. No. 3 Perkins, pl. str., 14".
Press, pugl. P-3 Ferracute, 2" str., m. d.
Press, pugl. crank, 50x4 Toledo, str. 8".
Press, pugl. crank, 72x4 Bliss s. s., 8" str.
Press, wheel, 200-ton, 93"x16".
Punch & shear, S. E., 12" tht. 3"x1".
Punch & shear, S. E., 15" tht. 3"x1".
Riveters, No. 3-A, and 120 Grant m. d.
Roll, (perfect circle) No. 10 K. & R. cap. 2"x8".
Rolls, 30"x6" United, 3-rolls (for leather).
Saw, metal band, 20" Laidlaw, m. d.
Shapers, 16" and 20" Smith & Mills.
Shaper, 24" Barker, "v-vam".
Shaper, 7" Rhodes with slotting attachment, m. d.
Shear, alligator, 18", 8" blade.
Shear, alligator, 24", 10" blade.
Shear, gate, 52"x8" L. & A., 15" gap, b. d.
Shear, squaring, 36"x16 g. a., foot power.
Testing machine, 1000 lb. Olsen hyd., hand.
Tearing machines, Economy 500 and 1000 lbs.
Tiersing machines, 600 and 1000 lb. Economy hand.
Welder, arc, 300 amp. Star, 3/60/220 v.
Welder, spot, 5 k. v. a. Eisler No. 295, 60/220.
Welder, arc, 180, 280 amp., a. c.

USED AND REBUILT MACHINERY

FOR SALE BY

**Box No. 120 c/o Hitchcock Publishing Co.,
508 S. Dearborn St., Chicago, Ill.**

Automatic screw machine, 2" Model "A" Cleveland, serial number over 19,000, double cross slides, in good running condition, complete with c/s.
Automatic screw machine, 1 1/2" Model "C" Cleveland, serial number over 33,000, motor driven, excellent condition.

FOR SALE BY

**Wisconsin Gear & Engineering Co., Inc.
602 So. 2nd Street, - Milwaukee, Wis.**

Bilgram Bevel Gear Generators.
Guaranteed to be in A-1 condition with all change gears and segments.

FOR SALE BY

**Standard Machinery Co.,
347 Indiana Ave. Grand Rapids, Mich.**

Automatic, 1 1/2" Gridley, model F.
Boring mill, 42" Bullard vertical.
Boring mill, 24" Lucas horizontal.
Drills, 14", 15", 20", 26", 36", etc.
Drill grinder, Sellers 3" capacity.
Grinders, cylinder, knife, saw, surface, utility.
Lathes, engine, mfg., turret.
Miller, model C-1 Becker heavy vertical.
Miller, No. 2V Reed-Prentice m. d. vertical.
Saws, band saws, cold saws, hack saws.
Shaper, 18" Hendey, f. g.

FOR SALE BY

**Dixie Mill Supply Company, Inc.
Tchoupitoulas and St. Joseph Streets,
New Orleans, - - - La.**

Air tools, large assortment rebuilt.
Bulldozer, Cleveland Punch & Shear Wks., hvy. type.
Boit machine, 24" Acme, with c/s and dies.
Boring mill, 10-16" Niles, 80" table, 2 heads.
Compressor, 10x12" sgl. cyl., b. d. with 25 h. p. motor.
Drill press, 20" Barnes b. g., with pwr. fd. & auto. stop.
Drill press, 21" Champion, b. g., with power feed and automatic stop.
Drill press, 26" Barnes sliding head, b. g., pwr. feed.
Drill press, 5' Niles radial, with d. c. mir. and control.
Drill, radial, 4' Amer. triple grd., single pulley drive.
Hack saw, 6' 36" Peerless, single pulley drive.
Lathe, 16"x10" Carroll Jamieson, q. c. g., with chuck, c/s, etc.
Lathe, 18"x8" Prentice, g. h. q. c. g., with chuck, etc.
Lathe, 25"x18" LeBlond, q. c. g., 3 step cone head, with chuck, c/s, etc.
Lathe, 36"x20" Pond triple grd., int. face plate drive.
Milling machine, No. 2 LeBlond univ., with vise, div. head and chuck.
Milling machine, No. 3-H LeBlond pl., with countershaft and vise.
Planer, 26"x8' Woodward & Powell.
Planer, 36"x36"x14" Cleveland upside.
Planer, 46"x14" Pond, belt driven.
Shaper, 24" Cincinnati, cone driven with c/s and vise.
Shaper, 25" Smith & Mills, with c/s and vise.
Shaper, 25" G. & E., sgl. pul. dr. v ram type with vise.
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Hack saws, 4x4": 6x8": 8x8": 9x9" capacity.
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Presses, punch, No. 1, 2, 3, 4, 5 o. b. l.

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Dial Feed Bliss & V. & O. All Sizes—O. B. I.
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- No. 4 Cincinnati H.P. Univ. S.P.D.
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- No. 4 Kempsmith Maxmillier, M.D. Rap. Trav.
- No. 4 Cincinnati Univ. H.P. Cone. Div. Hd.
- No. 2 Kempsmith Plain, cone.
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- 24" Cincinnati Automatic Miller, S.P.D.

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- No. 51 Oliver Drill Grinder M.D.
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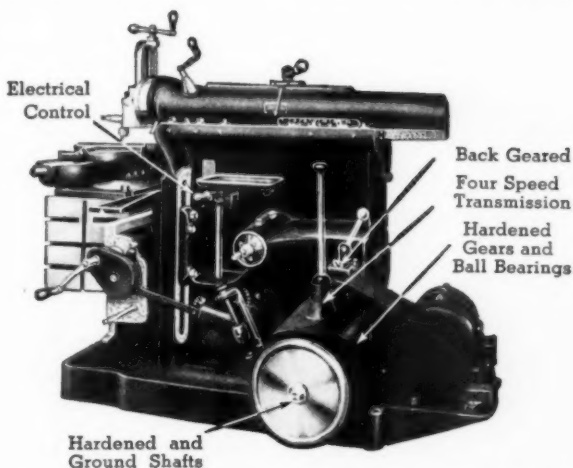
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17"x8" Bickford, DBG. QCG.

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21" Type H. Gisholt, 3¾" hole.
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20" Cincinnati, traveling head, MD.

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Square, Stark 9": 18 ga. cap.

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GRINDERS—P & W 12" vert. surf.; Cin. No. 1½ and B & S No. 12 univ. tool, B & S Nos. 11 and 16 plain, Heald Nos. 60 & 65 Int.; B & S No. 13 Univ. and Tool; Landis 10x30" Plain; B & S 10x48"; 3—Norton 6x32" plain, Heald No. 20 Rotary Surface (3). B & S No. 2 Univ.; Badger No. 220, auto. d. e., opposed disc (4); Heald 16" Chuck Rot. Surf., Walker 8" Rot. Surf.; Modern No. 6 Internal; Diamond No. 2 Auto. Horiz. Surf. (2).

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LATHES—Monarch 16"x10' M.D.; LeBlond 18"x8'; Lehmann 18"x9'; Amer. 22"x8'; Monarch 14"x6'; Davis 22"x10'; L & S 20"x10'; S-B & E 20"x10' q. c. g.; Flather 22"x10'; LeBlond 16"x6" and 16"x8"; P & W 17"x10'; Gleason 45"x12'; Johnson 36"x24'; Monarch 16"x8" (2).

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14" Pratt & Whitney Vert. Surface.
No. 16A Blanchard Automatic
Surface, Three M. D.
No. 13 B. & S. Univ. and Tool
Heim Centerless.

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Type D. S. S. D. Toggle, M. D.
Several—No. 0 Waterb.-F. Late
Type D. S. S. D. Toggle, M. D.
No. 22 Waterb. Farrel D. S. S. D.

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14"x5" American Geared Head.
14"x6" Hendey Yoke Head.
14"x6" L. & S. Selective Grd. Hd.
14"x6" American Geared Head.
17"x6" LeBlond Heavy Duty.
48"x16" McCabe Double Spindle.
26"x48"x24" McCabe Dbl. Spdle.

MILLERS

No. 33 B. & S. Auto., M. D.
No. 20 Van Norman Duplex.
No. 4B Brown & Sharpe Plain.
No. 13B Brown & Sharpe Plain.
No. 2 Kempnath Vert. Maximill.
No. 14 Garvin Vertical.

No. 2M Cincinnati Vertical.
No. 2A B. & S. Universal, M. D.
No. 2 Brown & Sharpe Universal.

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All sizes Brown & Sharpe.
73 1/2" Model A Cleveland.
3 1/2" Cone, Four Spindle.

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Several—No. 1 Manville Aut. Scr.

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No. 10 Waterbury Farrel Recip-
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Several—No. 1B Manville.

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2 1/2"x24" Jones & Lamson Steel
Flat Head, M. D.
No. 4 W. & S. Grd. Hd. Univ.
No. 3 Foster All Geared Head.

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8" Cleveland, Model B.

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4" Chicago, box and pan; 8" Chicago
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20" to 28" Barnes and Milwaukee.
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1 & 2 spindle, Allen, M. D., B. B.
3 sp., Leland-G. B. B., mtr. & p. f.
one, sp., 12" over-hg., No. 4 taper
4 spindle No. 2 Aveymatic, B. B.
4 spindle Leland-Gifford, p. f.
6 spindle Kerns B. B., M. D. tap-
ping attach, on each spindle.

Grinders

12" Arter, Rotary Surf., M. D. (2).
No. 3 Cincinnati Centerless, M. D.
No. 13 B. & S. Universal Tool.
Disc, Nos. 4 & 6 Gardner, B. B.;
26" Badger, B. B.

Gear Hobbers

No. 12-H Gould & Eberhardt.

Hack Saws

6"x6" Peerless Univ. Shap. M. D.

6"x6" & 9"x9" Peerless, M. D.

Lathes

14"x19" Fay Automatics, (4).
12"x5" Hendey, Grd. Hd., M. D.
14", 16", 18" Hendey.
14"x6" & 16"x6" Bradford.
14"x6" American, Grd. Hd., M. D.
14"x6" & 20"x6" American.
20"x9" & 28"x11" Hamilton.
20"x10" & 24"x12" Schumacher.

Milling Machines

Duplex No. 3 Pratt & Whitney.
Pl. No. 1 Knight; No. 14 Valley City;
No. 2 Rock., SPD; No. 2B B. & S.
Universal, No. 2A B. & S., M. D.;
Nos. 1 & 2 Kemps.; No. 35 Ohio;
Vertical Nos. 3-H & 4-B Becker.

Nibblers

Nos. 1 & 1B Campbell, 6 & 24" thr.

Planers

42"x42"x14" Hamilton.
26"x26"x6" Ohio.
30"x30"x6" Columbia.

Plating Generator

1500 amp. Chandeyason, direct con-
nected to Synchronous motor.

Presses

Cam Drawing, No. 1 Bliss b. g.

Horn, No. 22 Consolidated.

O. B. I. Nos. 1, 2, 3, 4 & 5A Toledo;
No. 16 Stoll, M. D.; Nos. 4 & 5
Bliss, B. G.

Radial Drills

3" Bickford, Motor Drive.
4" Gen-Rad, Motor in Head.
5" Carlton, M. D., Enclosed Head.

Saw

No. 2 Ryerson Friction, M. D.

Shapers

16" & 21" Milwaukee, B. G.
16" & 20" G. & E. B. G.
24" Amer., 24" Stockbridge, M. D.

Shears

10" Chicago, 10 ga., M. D. pwr. sq.
3"-10 ga. Niagara power square,
316-B Niagara, circle.

Screw Machines

Nos. 0 & 1 B. & S., M. D. Hand.
Nos. 0 & 1 Foster, Hand.
Nos. 2 & 4 Warner & S., G. F. H.

Thread Miller

6"x14" Pratt & Whitney.

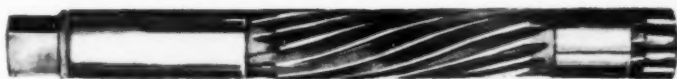
Welders

Arc: 200 amperes U.S.L.
Butt: 15 K. W. Toledo.
Spot: 5 K. W. Dyer; 10 K. W. Fed-
eral, Motor Drive, 20 KW Taylor.

VICTOR MACHINERY CO.

130-132 South Clinton St.,
Chicago, Illinois

Victor's Bargains In New SPIRAL EXPANSION REAMERS



DECIMAL SIZES	FRACTIONAL SIZES	LENGTH OVERALL	LIST PRICE	OUR PRICE
.500	1-2	8 1/2	\$ 4.40	\$ 1.76
.562	9-16	8 3/4	4.70	1.88
.609	39-64	9	5.15	2.06
.625	5-8	9	5.15	2.06
.656	21-32	9	5.70	2.28
.667		9	5.70	2.28
.687	11-16	9	5.70	2.28
.730		9 1/4	6.20	2.48
.734	47-64	9 1/4	6.20	2.48
.740		9 1/4	6.20	2.48
.750	3-4	9 1/4	6.20	2.48
.796	51-64	9 1/2	6.80	2.72
.812	13-16	9 1/2	6.80	2.72
.843	27-32	9 3/4	7.40	2.96
.850		9 3/4	7.40	2.96
.859	55-64	9 3/4	7.40	2.96
.865		9 3/4	7.40	2.96
.875	7-8	9 3/4	7.40	2.96
.917		10	8.05	3.22
.937	15-16	10	8.05	3.22
.968	31-32	10 1/2	8.70	3.48
.984	63-64	10 1/2	8.70	3.48
.990		10 1/2	8.70	3.48
1.000	1	10 1/2	8.70	3.48
1.047	3-64	11	9.35	3.74
1.062	1-16	11	9.35	3.74
1.093	3-32	11 1/8	10.00	4.00
1.125	1-8	11 1/8	10.00	4.00
1.156	5-32	11 1/4	10.70	4.28
1.187	3-16	11 1/4	10.70	4.28
1.218	7-32	11 1/2	11.45	4.58
1.225		11 1/2	11.45	4.58
1.235		11 1/2	11.45	4.58
1.250	1-4	11 1/2	11.45	4.58

For all around reaming purpose this tool is all the mechanic can ask for. Note the roughing end, and the oil grooves in both the pilot and shank.

EXPANSION LIMITS—We are not responsible over these guaranteed limits:—
1/2-in. to 5/8-in.—.012; 1 1/16-in. to 7/8-in.—.014; 15/16-in. to 1 1/4-in.—.016.

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16—26' Niles Ex. Type Hvy. Duty Bor. Mill.
 14—20' Niles Tool Works Ex. Type Bor. Mill.
 10—16' Niles Tool Works Ex. Type Bor. Mill.
 10' Niles-Bement-Pond Hvy. Boring Mill.
 100" CINC. MASSIVE PAT. Bor. Mill.
 96" Niles Heavy Duty Boring Mill.
 90" Niles-Bement-Pond Driving Wheel Lathe.
 85" Putnam Driving Wheel Lathe.
 48" Niles-Bement-Pond Car Wheel Lathe.
 109"x50" N.B-P Hvy. Duty Ghd. Hd. Lathe.
 96"x48" Niles-Bement-Pond Ghd. Hd. Lathe.
 84"x29" Niles-Bement-Pond Lathe M. Dr.
 54"x30" Pittsburg Geared Hd. Lathe.
 55"x120" Stamets Boring Lathes. (NEW)
 No. 2 Cincinnati Hi-Power Pl. Miller.
 No. 2 Cincinnati Hi-Power Univ. Miller.
 No. 3 Van Norman Duplex Miller, M. D.

No. 3 Cinc. Rect. O-arm Universal Miller.
 No. 4-A Brown & Sharpe Universal Miller.
 Nos. 2 & 3 Brown & Sharpe Vert. Millers.
 84"x75"x24" N.B-P Adj. Rail Miller.
 92"x87"x42" N.B-P Planer 4 Heads, M. D.
 84"x84"x20" N.B-P Planer 4 Heads, M. D.
 72"x72"x20" Cincinnati Planer 4 Heads.
 60"x60"x12" N.B-P Planer 4 Heads M. D.
 500 Ton N. B-P Double End Car Wheel Press.
 No. 52 SRG Ferracute Dble. Crank Press.
 No. 7 Hilles-Jones Multiple Punch M. D.
 5"x5" Carlin High Knife Alligator Shear.
 No. 1 Hilles-Jones Splitting Shear.
 No. 2 Hilles-Jones Angle Shear.
 No. 1 Hilles-Jones Plate Straightening Rolls.
 20' 6" H & J Plate Bending Rolls Drop End.
 30"x1' Southwark Plate Bending Roll D. E.

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1725 Broadway,
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MISCELLANEOUS MACHINES

12x6 Hendey Lathe Grd. Hd., Taper, M. D.
 14x6 American Cone, with Taper.
 16x8 Prentice Grd. Hd., with Taper.
 20x10 Hendry Cone Hd., M. D.
 20x10 American Grd. Hd., M. D.
 20x10 Lodge & Shipley Grd. Hd., M. D.
 20x10 Monarch Grd. Hd., Taper.
 30x10 Prentice Grd. Hd., with Taper.
 30x12 LeBlond Cone Head, Heavy Duty.
 32x14 Lodge & Shipley Cone Head.
 36x18 Schumacher & Boye Cone Head.
 Sundstrand Stub Lathe, face, Att., M. D.
 18" Type C Libby Turret Lathe.
 26" Type C Libby Turret Lathe.
 No. 2-A W. & S. Univ. Turret Lathe, M. D.
 No. 3-A W. & S. Univ., M. D.

34" King Bor. Mill, Turret Head.
 42" King Bor. Mill, 2 Swivel Heads.
 48" Colburn Bor. Mill, 2 Swivel Heads.
 52" King Bor. Mill, 2 Swivel Heads.
 52" Gisholt Bor. Mill, 2 Swivel Heads.
 3½" Western Radial Drill, M. D.
 4" Cincinnati 11" Col. Radial, M. D.
 5" American 14" Col., M. D.
 6" American 16" Col., Motor on Arm.
 7 spindle, Foote-Burt No. 2 Gang Drill.
 No. 2 3-Spindle, Colburn Consolidated.
 No. 1776 G. & E. Gear Hobber, 14" dia.
 No. 2 Cincinnati Centerless Grinder.
 No. 70 Heald Internal Grinder, M. D.
 No. 2 Milwaukee Plain Miller.
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*We carry a large stock of used machine tools.
 Your inquiries will be appreciated.*

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HILL-CLARKE QUALITY

BORING MACHINES

No. 1 Cleveland, 2½" bar.
No. 3-A Universal, 3" bar.
No. 2 Rochester, 3" bar.
No. 3 Hamilton, 4½" bar, Fl. Type.
5" Bar Niles-Bement-Pond, Fl. Type.

BORING MILLS

No. 1-A Pratt & Whitney Jig Borer.
24", 36" Bullard "New Era".
30", 52" King.
42", 48", 54", 60" Colburn.
62", 72" King.

DRILLS

1, 2, 3, 4, 6-spdl. Leland-Gifford.
No. 2—4-spdl. Leland-Gifford, Motor Spdls.,
with Power Feed.
1, 2, 3, 4, 6, 8-spdl. Henry & Wright.
32" Cinn.-Bickford, Sliding Head.
No. 2 Colburn, 1, 3, 4 Spindle.
No. 4 Colburn, 2, 3-spdl.
No. 2, No. 3 Defiance Hvy. Service.
No. D-4 Colburn Heavy Duty.
No. 14 Natic Multiple.
No. 1, No. 3, No. 4 Bausch Multiple.
4' Western Plain Radial.
5' Cinn.-Bickford Plain Radial.
5' American Full Universal Radial.
6' Western Plain Radial.

GEAR CUTTERS

No. 2, 3 & 12 Barber-Colman Hobber.
No. ½, No. 1 Pfauter Hobber.
No. 4—36", No. 4—48" Brown & Sharpe.
No. 2, No. 3 Pfauter Hobber.
No. 2—60" Goss Hobber.
Nos. 6, 61, 615, 62, 624, 645 Fellows, M.D.
No. 18-H Gould & Eberhardt Hobber.

GRINDERS

8"x18", 36" Cinn., Plain, Saddle Type.
20"x168" Landis Pl., Motor Drive.
26"x96" Landis.
No. 2 Brown & Sharpe Universal.
No. 4, No. 4-A Landis Universal.
No. 70 Heald Internal.
No. 10—16" Blanchard Vert. Surface.
No. 16-A Blanchard Auto. Vert. Surface.
No. 2—18"x6" Reid Surface (New).

LATHES

14"x8" Lodge & Shipley Sel. Grd. Hd.
16"x6" 12' Lodge & Shipley Grd. Hd.
17"x8" Le Blond Hvy. Duty Grd. Hd. M.D.
18"x8" Lodge & Shipley Sel. Grd. Hd.
19"x8" Le Blond Hvy. Duty Grd. Hd. M.D.
19"—38"x10' Le Blond Sliding Bed Gap.
20"x14" Lodge & Shipley Sel. Grd. Hd.
24"x14", 16' Lodge & Shipley Grd. Hd.

NORTON MOTOR DRIVEN GRINDERS

6"x32"	10"x50"	14"x72"
10"x18"	10"x72"	14"x96"
10"x24"	10"-15" gapx72"	16"x50"
10"-15" gapx24"	14"x36"	16"x72"
10"x36"	14"x50"	18"x96"
20"x96"	22"x120"	

24"x14", 16' American, Geared Head.
25"x10", Le Blond, Power Feed Turret.
26"x30" Beye & Emmes.
30"x11", 15' American, Geared Head.
30"x16", American taper attach.
36"x12", L. & S. Sel. Triple Grd. Hd.
36"x14", 20' Lodge & Shipley Sel. Grd. Hd.
66"x21", Putnam Triple Geared, M.D.

MILLERS

No. 2-B, No. 3-B Milwaukee Plain.
No. 3-H Le Blond Plain.
No. 3 Cincinnati, Plain.
No. 3-B, No. 4-B Hvy., Brown & Sharpe, Pl.
No. 2-B, No. 3-B Milwaukee Universal.
No. 4-A Brown & Sharpe Universal.
No. 3-B Milwaukee Vertical.
No. 3, No. 4 Cincinnati H. P. Vertical.
No. 5-B, No. 6, No. C-2 Becker Vertical.
No. 5—48" Cincinnati Hydromatic.
6"x14", 6"x48" Pratt & Whitney Thread.
No. 4, No. 8 Lees—Bradner Thread.
18" & 24" Cincinnati Auto. Duplex.
24" Cincinnati Auto. Simplex.
24"x24"x12' Ingersoll Adjustable Rail.
36"x36"x12' Newton Duplex.

PLANERS

30"x30"x8" American.
30"x30"x18" Cincinnati.
30"x30"x14" Gray, reversing motor dr.
36"x36"x8", 12", 18" Cincinnati.
36"x36"x12" Gray Maximum Service, M.D.
36"x36"x14"—24' Cleveland Open Side.
36"x36"x24" Gray.
42"x42"x30" Niles-Bement-Pond, Rev. M.D.
48"x48"x10' Detrick & Harvey, Open Side.
48"x48"x16" Niles-Bement-Pond.
72"x60"x16" American Widened Pattern.
72"x72"x16" Cincinnati M.D.

SHAPERS

20" Smith & Mills.
24" Gould & Eberhardt.
29" Averbach.

TURRET LATHES

No. 1-B Foster Universal, A. C. & B. F.
No. 1-A Warner & Swasey, Motor Drive.
No. 3-A Warner & Swasey.
No. 3 Cinn.-Acme, A. C. & B. F.
No. 4-A Warner & Swasey, Motor Drive.
26" Libby-International, 7½ H. S.

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645 W. WASHINGTON BOULEVARD, CHICAGO

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LATHES

14x6' Willard Grd. Hd., M. D.
18x10' LeBlond Q. C. Cone Dr.
20x12' American Q. C. Cone Dr.
32x12' Boye & Emmes Cone Dr.
36x14' American Cone Drive.
36x18' Fildford Cone Drive.

MILLERS

No. 4 LeBlond Plain, Cone Drive.
No. 2B B. & S. S. P. Dr.
No. 2B K. & T. Plain S. P. Dr.
No. 1½A Rockford Cone Dr.

PRESSES

No. 6-H Toledo O. B. I.
No. 17 Stoll O. B. I.
Toledo Nos. 90C & 92C dbl. crk.
No. 94 Cons. stiff back.
ALL SIZES open back.
Inc. Horning presses.

SHAPERS

21st Smith & Mills Cone Drive.
24th G. & E. Cone Drive.
24th Potter-Johnson Univ.

SEARS

83"x¾" L. & A. 10th gap.
66"x¼" L. & A. 6th gap.
96"x10 Gauge Robinson.
48"x16 Ga. 12th Gap.
Nibbler—Gray 7½" cap.

MISCELLANEOUS

42nd King boring mill, 2 heads.
5th American Radial S. P. D.
12x15 Racine Hack Saw.
No. 2B Foster Grd. Hd., S. P. D.

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DRILLS

28th Cin-Bick. Tap. Att., Gr. Box.
21st Roversford b.g. pwr. fd. new.
No. 2, 4-spindle Aveymatics.
No. C-5 Natco, 10 spindles.
1, 2, 3, & 5 sp. Allen, h.s., b.b.
4-spindle L-G No. 2 M. T. p. f.
4-Spdl. No. 1750 F. C.-O., B. B.
Motor Drive.
6 Spdl. Allen, 12th O. H., H. S.
Ball Bearing.
3½" Feedick rad. gr. box s.p.d.
5th Dress Univ. rad. arr. m. d.

GEAR HOBBERES

No. ½ Schuchardt & Schutte.
No. 3 Barber Colman, m. d.

GRINDERS

Nos. 1 & 3 B. & S. Univ. 3 mtrs.
No. 70 Heald Internal, Belt Dr.
No. 20 Heald rotary surface.
12th Arter Rot. Surface M. D.
No. 2 Gardner disc. 18", disc pr.
No. 2 B & S surf. b. d.
No. 11 Brown & S. plain, m. d.
No. 2 Norton cutter & reamer.
No. 1 Cincinnati tool & cutter.
5 H. P., 18" Queen City Disc.
b. b., New.
No. 2 Heim Centerless, M. D.

LATHES

28"x11" Hamilton q. c. g. t. a.
24"x12" Schum. B. q. c. g. t. a.
20"x11" Cicum Grd. Hd., M. D.
20"x10" Schu., Boye & E., q. c. g.
20"x9" Hamilton, q. c. g.
18"—26"x8" S. B. Gap, q. c. g.
18"x8" B. & E., q. c. g. t. a.
18"x8" Hendey, q. c. g.
16"—24"x10" S. B. Gap, q. c. g.
16"x8" Monarch, grd. hd. Tim-
ken Bearing, Taper Attach.
16"x6" South B., q. c. g. t. a.

16"x6" C. & J., grd. hd., Timken
Bearing, motor in base, new.
15"x6" C. & J. c. hd. q. c. g., new.
14"x6" LeBlond, q. c. g., t. a.
14"x6" Hendey, Tap. Att. Col.
15"x6" Sebas. grd. hd., q. c. g.,
m. d.

MILLING MACHINES

No. 2 BS. C. & T. Univ., Dbl.
0 A; S. P. D.
No. 3 Kemp, Univ. C. H. B. G.
No. 4 Hendey Norton Pl. S. P. D.
No. 3 Becker vertical.
No. 4B Becker, vert., b. b., spdl.
Model "B" Becker, h. p. vert.
No. 2½ Rockford universal.
No. 3 Rock'd Rigidmill, M. D.
4½"x12" Pratt & Whitney thrd.
No. 6 Whitney hand, motor dr.
No. 2Y. B. & S. Pl., mtr. drive.
No. 2A B. & S. Univ., M. D.
No. 2, B. & S. Plain, cone head.
No. 2, Van Norman Sub Head.
No. 1 B. & S. Plain, cone head.

PRESSES

Nos. 5 & 6 Bliss-Cons. O. B. I.
Geared.
No. 95 Bliss Gap Frame.
No. 2 Manhattan Screw, 40 ton.
No. 3 Bliss-Cons. o. b. i. 2nd str.
No. 1 Bliss Cam, Fly Grd.
No. 6 Fox "Superflex".
No. 2 Bliss-Cons. o. b. i. 1½" str.
No. 1 to 8 Rockford, o. b. i. new.
No. 1 Loshough J. o. b. i.

SCREW MACHINES

No. 11 B & S Hand m. d.
No. 1 B & S Hand m. d.
No. 0 B & S Hand m. d.
No. 00 B. & S. Automatic, b. d.

SHAPERS

28th Cin. B. G. Crk., Hel. Grd.,

M. D., Forced Fd. Lubrication.
24th American & Stockbridge
b. g. crank, m. d.
24th Milwaukee back grd. crk.
20th Hendey B. G. Crk. S. P. D.
20th G. & E. Millw. b. g. crk.
16th G. & E. b. g. crank.

TURRET LATHES

No. 6 W&S Grd. Hd. Univ. Tim.
bearing, Motor Drive.
No. 4 W. & S. Univ. M. D.
No. 2A W&S Univ. 3¼" Hole.
M. D. Bar and Chuck. Equip.
No. 2A W. & S. Univ. 2½" Hole.
No. 2 Bardona-Oliver.
24th Bul'd Vert. Rap. Prod. M. D.

MISCELLANEOUS

Bolt Cut. 1½" Landisld. ac., 2hds.
Bolt Cut., 2½" Landia Lead Scr.
Boring Mill, No. 3A Univ. Hor.,
s.p.d.
Broach, No. 3 Oilgear.
Comp. 7x6 Worth. Dup., M. D.
Die filer, No. 5 Rearwin, m. d.
Die filer, No. 5 Thiel, motor dr.
No. 2A, H. D. hi-sd. Riv. hammer.
Keyseater, No. 2 Davis, ¾" cap.
Nibbler, No. 2 Campbell, M. D.
Punch & Shr., No. 55 H. & W.
Saw, 6 x 6th Peerless universal
shaping, motor drive.
Saw, 3x9th Peerless, high speed.
Shear, 10th 14 ga. D. & K. Pwr.
Square, Motor Drive.
Tapper, No. 1 Garvin, b. b., m. d.
Tester, 50,000 lbs. Tin. Olsen
Univ., M. D.
Welder, 12½" K. W. Federal
Spot, 220 V.
Welder, No. 20A Thomp. Butt.
Wheel Pr., 150 Ton, G. R. Hyd.

George M. Bernstein & Co.

12 SO. CLINTON STREET

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GET MILES' QUALITY

BROACHES

- No. 1 Foote Burt vert. surf. hydr.
- Nos. 25 Lapointe hydraulic.
- No. 3 Oilgear hydraulic.
- 10 Ton Metalwood vert. hydr.
- 15 Ton Oilgear vert. hydr.
- 2 Ton American vertical.
- No. 3 American rack.
- No. 3JN Lapointe double.
- Nos. 0, 3 & 4 Lapointe screw.

BORING MILLS

- 3" Lucas No. 31 with jig boring attachment.
- 3" Blinco, elevating knee.
- 3 1/2" No. 0 Giddings & Lewis.
- 24" Bullard with slide head.
- 34" Colburn single turret.
- 36" Niles car wheel.
- 42" King.
- 42" Detrick & Harvey.
- 51" Bullard.
- 60" Gisholt.

DRILLS

- 21", 24" & 28" Cincinnati.
- 24" Barnes all geared.
- 21", 24", 28" Superior.
- 24" Aurora.
- 30" Snyder.
- No. 121, 217, 314, 315, 321 Baker.
- No. 2 Mfg. Colburn 1, 2, 3, 4 spindle.
- Narco multiple, Nos. 11, 12, C12, 13, C13, 14, B14 & 30.
- Nos. 1 & 3 Bausch multiple.
- No. 1 Pratt & Whitney gun.
- 6 spindle, Pratt & Whitney deep hole.
- Nos. 6D, 11D & 16D Moline.
- No. 10D Moline cylinder borer.
- 5 spindle, Detroit automatic.
- Nos. 15 1/2 & 17 Foote Burt.
- 2 1/2" Morris radial.
- 3" American sensitive radial.
- 3" Dresser radial.
- 3" Clint. Bick. radial.
- 3 1/2", 4", 5" & 6" Western radial.
- 4" Mueller radial.
- 4" Hammond radial.
- 6" N.B.P. univ. radial.
- Sensitive: All makes and sizes.

FORGING TOOLS

- Nos. 25, 8 & 9 Williams & White bulldozers.
- No. 5 I Nazel hammer.
- No. 1A Ajax forge rolls.
- 1", 1 1/2", 2" & 4" Ajax up-setters.
- 1 1/2" Acme upsetter.
- 1 1/2" No. 3 W. F. cold header.

GEAR CUTTERS

- Nos. 3 & 12 Barber Colman.

GRINDERS

- No. 2 Cincinnati centerless.
- No. 2 Helm centerless.
- No. 72A3 Heald Sizermatic.
- Nos. 70 & 72 Heald internal.
- No. 12 Bryant internal.
- No. 3 Barber Colman hob.
- 16"x32" Norton crank.
- 16"x48" Landis crank.
- No. 4 Brown & Sharpe univ.
- Nos. 1, 2 & 2 1/2 Bath universal.
- No. 16 Blanchard surface.
- 6"x18" No. 2 B. & S. surface.
- 6"x36" Norton surface.
- 7"x45" Bath surface.
- 8"x22" No. 3 Abrasive surface.
- 8"x38" Manhattan surface.
- 12"x48" Springfield surface.
- 14"x48" No. 5 Abrasive surf.
- 20"x50" Safety Emory surf.
- 30"x84" Diamond face.
- 18", 24" & 30" Gardner disc.
- Nos. 8 & 221 Badger disc.
- 24", No. 84 Gardner opp. disc.
- 30", No. 96 Gardner hydr. face.
- 8" Arter auto. piston ring.
- Landis:—6"x18" to 16"x53".
- Norton:—6"x32" to 14"x72".
- Modern:—12"x24" & 12"x60".
- Cincinnati:—12"x36".

GRINDERS

- No. 2 Cincinnati centerless.
- No. 2 Helm centerless.
- No. 72A3 Heald Sizermatic.
- Nos. 70 & 72 Heald internal.
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- Cincinnati:—12"x36".

ENGINE LATHES

- 14"x6" & 16"x6" Monarch.
- 16"x6" Hendey grl. hd. TA.
- 16"x6" Cisco geared head.
- 16"x9" Lehman geared head.
- 16"x8" & 16"x10" Lodge & Shipley geared head.
- 18"x8" Walcott.
- 18"x6" & 20"x8" Hendey, taper & relieving att'm't.
- 20"x10" Reed Prentice grd. hd.
- 21"x18" LeBlond heavy duty.
- 22"x10" Davis.
- 24"x14" Amer. Geared Head.
- 24"x16" Schumacher Boye.
- 26"x12" Wickes.

LATHES, TURRET

- Nos. 2, 2A, 3A, 4 & 6 W. & S.
- Nos. 1B, 3 & 4 Foster.
- 18" Libby.
- 21" Gisholt.
- 1 1/2", 3 1/2" Cincinnati Acme.
- 24" Bullard vertical.

MILLERS

- Nos. 2M, 3 & 4 Cincinnati.
- Nos. 2 Hvg. 3B & 4B Brown & Sharpe.

PLANERS

- No. 2A Milwaukee.
- No. 4 Hendey.
- No. 4 LeBlond.
- No. 2 B. & S. universal.
- Nos. 3 & 4 Cincinnati vertical.
- Nos. 1B & 6 Becker vertical.
- Nos. 3-24 & 4-36 Cincinnati Hydromatic.
- 24" & 48" Cincinnati duplex.
- 18", 24" & 48" Cincinnati auto.
- 48" Ohio tilted offset.
- 48" Newton cont. rotary.
- Nos. 13B & 33 B.&S. Mfg.
- Nos. 1 & 2 Kent Owens hand.
- Nos. 3 & 20 Sundstrand Rigid-mill.
- 60"x36"x8" Ingersoll adj. rail.

PLANERS

- 24"x24"x24" Cincinnati crank.
- 24"x24"x6" G. A. Gray.
- 32"x32"x12" Niles.
- 36"x36"x16" Cleveland Openside.
- 42"x48"x12" Cleveland Openside.
- 48"x30"x10" Liberty Openside.

PRESSES

- 750 ton Baldwin Southwark triple action hydraulic toggle, 11' 10 1/2" between up-rights, 84" shut height, 37", 26" & 12" strokes, 500,000 lbs., 3 1/2 years old.
- No. 496D Toledo double crank toggle drawing, 84" between up-rights, 110,000 lbs. Air cushions.
- 88", No. 10C Bliss double crank.
- 84", No. 04G Toledo dbl. cr., air cush.
- 60", No. 04E Toledo dbl. cr., air cush.
- 50", No. 60D50 Cleveland dbl. cr.
- No. 164 Toledo toggle drawing.
- No. 1 1/2 Bliss toggle drawing.
- No. 266 Consolidated cam draw.
- No. D100 Ferrucine cam draw.
- 100 ton, No. 6K Cleve. coining.
- 100 ton, No. 664 Toledo coining.
- 4" stroke, 40" width.
- Nos. 53 1/2, 56, 56 1/2, 58 Toledo.
- Nos. 62, 65, 66 Consolidated.
- No. 74 1/2 Bliss straight side.
- No. 30 1/2 Bliss arch frame.
- No. 8-7 Zeh & Hahnemann.
- No. 25 1/2 Consolidated horning.
- Nos. 16 & 4A Bliss horning.
- Nos. P4 & PG4 Ferracute.
- No. EG35 Erie punching.
- No. 94 Consolidated punching.
- Nos. 41 & 41A Toledo horning.
- No. 75 Toledo openback.
- 40 ton Wat. Farrell openback.
- No. 51 Cleveland OBL.
- No. 5 Toledo, OBL.
- No. 7 Cleveland, OBL.
- 71 & 88 ton W.F. OBL.

2100 TOOLS IN STOCK. SEND FOR LIST.

MILES MACHINERY CO.

SAGINAW
MICHIGAN

NEW 3 Phase Motors 1 to 20 H. P., 5 H. P. \$55.75**PRESSES**

Federal O. B. I. Bench (new)
 No. 1 Federal O. B. I. (new)
 No. 3 Federal O. B. I. (new)
 No. 1½ Robinson O. B. I. (new)
 No. 2 Robinson O. B. I. (new)
 No. 2½ Robinson O. B. I. (new)
 No. 10 Excelair Foot Press.
 No. 5 Willard O. B. I.
 No. 75 Toledo Open Back, not inclinable.
 No. 24 Toledo Double Acting Cam Drawing.
 No. 1 Stiles type.

MISCELLANEOUS

No. 23 Becker plain milling machine.
 No. 4 LeBlond plain milling machine.
 24"x20"x8" Ingersoll Miller, motor drive.
 16" Ohio back geared Crank Shaper.
 36"x36"x14" Gray Planer, 2 heads.
 36"x36"x12" Gray, extra hvy. pattern Planer, 4 hds.
 10" Chicago Brake, 10 ga.
 No. 0G Brown & Sharpe Automatic.
 Nos. 52, 53 & 55 National Acme Automatic.
 No. 1½ Valley City Plain Milling Machine.
 Brand new Marquette No. 300 welder, regular
 equipment greatly reduced price.

THE OSBORNE & SEXTON MCHY. CO., Dept. H. COLUMBUS, OHIO**PRESSES**

No. 79½ Bliss, new No. 312 S. S.,
 Tie Rod, Dble. Grd., 16" Stroke;
 Shaft 12" dia., B-d 41"x41".
 No. 306 Bliss, S. S., Tie Rod, Grd.,
 6" Stroke; Like New.
 No. 21½ Bliss O. B. I. m. d., 5" Str.
 No. 6 Niagara O. B. I., 3" Stroke.
 No. 2 Bil. & Spenc. S. S. Trim. Press,
 with Side Shr. Will handle hot Forge,
 trimmings from 1200-lb. Hammer.
 No. 5½ American Can Co. Double
 Crk. 36"x30 Bed, 2" str. 100 T. cap.
 No. 301-S Auto. Gang Press; does 8
 operations simultaneously.

SHEARS AND BRAKES

10"x½ D. & K. All-Steel M. D.
 Shear.
 8"x14 ga. Stoll No. 296—Grd. over-
 driven.
 52"x14 ga. Nis. No. 252 Grd. under-
 driven.
 36"x14 ga. No. 236 grd. under-driven.
 10"x10 ga. No. 204 Chicago Apron
 Brake, M. D.
 10"x10 ga. No. 73 — 10 Chicago
 Box & Pan Brake, Motor Drive.
BENDING ROLLS
 10"x½" H. & J. Pyramid, Drop end,
 Balance Bar, Belt Drive.
 6"x14 ga. Niagara, Geared Rolls, Slip

Type, Belt Drive.
 3"x12 ga. Niagara, Geared Rolls,
 Slip Type, Belt Drive.
 3"x14 ga. Badger, Geared, Hand
 Operated.
 60"x14 ga. N. B. P. Leveller Roll,
 7 Rolls 6" Dia.

WELDERS

15 K. W. Federal, 20" Throat.
 20 K. W. Winfield, 24" Throat.
 20 K. W. Toledo, Heavy Duty, 27"
 Throat, Ram Type.
 30 K. W. Federal Ram Type, No.
 412B—12" Throat.
 47 K. W. Taylor Winfield, Ram
 Type, 27" Throat.

FALK MILL SUPPLY CO., Machinery Merchants 18 WARD ST., ROCHESTER, N. Y.**LATHES**

26/48"x14" McCabe Double Spindle.
 24"x10" Bradf. rd.
 20"x10" LeBlond.
 18"x8" Monarch.
 16"x10" Sebastian.
 16"x8" Bradford.
 14"x8" Hamilton.

SHAPERS

16" Smith & Mills.

20" Steptoe.

20" American.

24" Gould & Eberhardt.

MILLING MACHINES

No. 1 Brown & Sharpe Universal.
 No. 1½ Brown & Sharpe Universal.
 No. 2 Hendey Universal.
 No. 1 Brown & Sharpe Plain.
 No. 2 Brown & Sharpe Plain.
 No. 4B Heavy Brown & Sharpe Plain.

McBRIDE & McCLENNEN Since 1919*Trading As***DELTA EQUIPMENT CO. 148 N. Third St., Philadelphia, Pa.****\$100,000****AVAILABLE**

FOR THE PURCHASE OF COMPLETE INDUSTRIAL PLANTS OR
 YOUR SURPLUS EQUIPMENT—COMMUNICATE
 WITH US IMMEDIATELY

Box No. 122 c/o Hitchcock Pub. Co.
508 SO DEARBORN ST., CHICAGO, ILL.

INTERSTATE *has It!*

HIGH GRADE PRESSES

PRESSES, STRAIGHT SIDE, TIE-ROD

No. 6 Am. Can; No. 56 Toledo.

No. 58 Niagara.

No. 75½ Bliss, 11" Str. (3).

No. 4116½ Hamilton tie rod, 41" bet. hgs.,

No. 2719 Hamilton, 1,000 ton; 5¼-S Toledo, wgt. 80,000.

PRESSES, DOUBLE CRANK

No. 615-F Nia. 50x84—bed 12" stroke air

cushions; No. 90E Toledo, 42" bet.; L & A

Gap, 48" bet. Gap Frame.

No. 8-F Bliss, 120" bet. hgs., 20" str.

No. 7-F Bliss, 96" between uprights,

No. 96-G Toledo, 149" between uprights, 24"

str., tie-rod, wt. 162,000 lbs.

No. 203E Tol., b.g., gap frame.

No. 17 Bliss, gap frame, 97" bed, 8" st.

Press, Wells, gang, No. 12, 6" bet. housings.

Hyd. Watson S., 200 ton, 2-10" rams.

PRESSES, TOGGLE

No. 409 Bliss, 60x109, air cushion.

No. 408-B Bliss, 84" bet. upr., 58x84.

No. 5; No. 3½; No. 3½A; No. 3½B Bliss.

PRESSES, O.B.I.

No. 6A Bliss, 7" st., No. 31B McDonald

auto-feed. No. 5 Toledo; No. 3 Nia.;

No. 20C Bliss, m.d.; No. 62 Bliss, 8" st.

PRESSES, HORN

Nos 14½; No. 44P Toledo, swing table,

14½, No. 41; Bliss No. 21; No. 24.

PRESSES, COINING

No. 666 Toledo, 1000 ton.

No. 27K Bliss 1000 ton.

6-30 ton Waterbury-Farrel.

PRESS BRAKES,

Chicago All Steel, gap frame, 6' 10 ga.;

78", 14 ga.; 52" 18 ga.; 10' 10 ga.

PRESSES, STYLES

Ferracute No. P2, P3, P4; Toledo, 34P

(10); No. 3, 4, 4N-5N Bliss.

OTHER TOOLS IN STOCK

Angle Iron Shears, Coving, 6x4x¾", dbl. end.

Automatics, Brown & Sharpe, late serial

No. 00G—serial No. 9900; No. 00—serial

No. 9800; No. 0G over 6700.

Buffers, 3D Gardner, 5 h.p.; Hill Curtis 3 h.p.

Boring mill, 36" Bullard New Era, side head.

Boring mill, 88" Niles vertical,—42" N.B.P.

Brakes, box & pan, 6' 10 ga. Chicago Steel.

Brakes, hand, 10' 14"—8' 16, 8' 12.

Brakes, power, Chgo. Steel; 8' ¼"; 12' 10 ga.;

6' 12 ga.; 10' ¼"; 12' ¼", pwr. clamp.

Bulldozer, No. 23 Williams & White.

3½" Bar Univ. Hor. Boring Mill, m.d.
5' Amer. Radial Drill, Triple Purpose.
Roller Die Machine, 7 spindles, fully
adjustable, m.d.

Compressor, air, 10x10 Ingersoll Rand.

Die sinker, E3 Keller.

Drill, No. 14 Natco, mult.

Drill, No. 242 Barnes Camel Back.

Filing Machine, No. 3 Thiel, m. d.

Furnace, large elec. heat treat, pusher type.

Gang Slitter, 48" Bliss, 36" Streine.

Grinder, No. 3 Dia. surface.

Grinder, No. 4 Gardner disc, m. d.

14" Pr. & Wh. vert. surf.; No. 13 B & S Univ.

No. 3 Abrasive Surf. 84" Diamond Face.

Grinder, 8" Arter, rot. surface.

Grinder, Landis cyl., 22" swg. x 16' 6" bet.

centers, self-cont., extra wheels, fixtures.

Grinder, 16x66 Landis, No. 12 B. & S.

Groovers, power, 8' Nia.; 6' Stoll; 3' Nia.

Hammer, drop, 400 lb. Standard.

Ironworker, Univ., 6x6 ang.

Keyseaters, No. 2 Davis; No. 1 M&M.

Lathes, South Bend, 9'x3½"; 16/24 gap x8'.

Lathes, 30'x16' L&S, 48'x18 Schu. & Boye.

Lathe, 36'x30' L. & S., 24" centers, q-c-g.

Lathes, turret, W. & S. Univ., No. 3A; No. 2A;

No. 1A; No. 6, g.h., m.d.

Lathes, spin., Prybil 22", bb.; 20" Bliss.

Millers, hand, No. 2 Kent Owens, b.b. (3).

Millers, Pl., No. 2A K. & T.; No. 1A K. & T.,

Miller, 3-S Cinc. Pl.; No. 21 B. & S.

Millers, vert. No. 2, 3, 4B, 5B Becker.

Miller, 48" Cinc. auto.

Milling machine, Ingersoll planer type, with

40 h.p. motor, table 48"x22" 8".

Nibblers, Campbell No. 1 & 1B, m. d.; No. 2.

Pipe Threaders, 2" to 10".

Planer, 26"x8' Cleveland, openside.

Planer, 60x60x18 N. B. P., 4 hds., m. d.

Saw, Friction, No. 1, No. 0 Ryerson & No. 2.

Radial Drills, 5' & 6' American; 5' Fosdick.

Roller levellers, 48" 17 rolls, motor drive;

36" H. & J., 18 rolls; 60" McKay.

Rolls, Bend., 8' ¼" Beloit; 10' 18 ga. Beloit;

12' ¾" Niles Pw. Elev.; 4' 10 ga., 3' ¼",

Screw mach., auto., 4 spdle. Gridley, 1½" cap.

Shapers, 16" & 24" G. & E.

Shears, 52" 10 ga.; 52" ¾" Chgo. Steel.

Shear, Pels angle & beam, 8x8x¼".

Shears, throatless, 10 ga. ¼", ½"

Shears, power, 13' ¾" 8' ¼" Bertsch; 16'

3/16" L&A, 10' ¾", 10' 3/16" 10' 10

ga. Nia.; 10' 16 ga.; 80", ½" 24 gap;

156" 5/16" Bertsch.

Shears, Rot. Quickwork; No. 10, 60" thr., 14 ga.

No. 25 Quickw., 7/32" cap., 30" thr.

Welders spot: 5, 7½, 10, 25, 50KW; press type;

100 KW Federal; 75 KVA National.

Wire Straightener, ¾"x8"; No. 6 Wells, ¾"x22".

INTERSTATE

Machinery Co., Inc.



OFFICE AND SHOW ROOM, 109 SO. CLINTON ST., CHICAGO, ILLINOIS

EXCEPTIONAL TOOL VALUES

VERTICAL BORING MILLS
 72" 14-in.-diam.-Pond 2 swivel hds.;
 Power Rapid Traverse; Motor Dr.
 54" Colburn; 2 swivel heads; Power
 Rapid Traverse; Motor Drive.
 60" Gisholt; 2 swivel heads; Power
 Rapid Traverse; Motor Drive.
 42" King; 2 swivel heads, Power
 Rapid Traverse; Motor Drive.
 48" Colburn; 2 swivel heads; S. P. D.
 42" Bullard; 2 swivel heads; Power
 Rapid Traverse; S. P. D.
 36" Bullard; 2 swivel heads; B. D.
VERTICAL TURRET LATHE
 42" Bullard New Era Type; M. D.

MILLING MACHINES
 No. 5 Cincinnati High Power Plain;
 Rect. Overarm; Power Rapid Trav.
 & Reverse; Intermittent Feed; M. D.
 No. 2-B Brown & Sharpe Pl.; M. D.
 No. 2-A B. & S. Universal; M. D.
 No. 3.3 Kempenit Production; M. D.
 No. 4 Brown & Sharpe; Belt Drive.
 4" Pratt & Whitney Spline.
 Nos. 1, 2, & 3 Cinc. Pl.; Belt Drive.

LATHES
 36"x17" Bridgeford, Grd. Hld.; M. D.
 30"x17" Houston, Stanw. & G.; B. D.

26"/48"x28" McCabe Double Spindle
 Screw; Belt Drive.
 18"x8" National; Belt Drive.
 16"x8" Lodge & Shipley; Sel. Grd. Hld.
 Motor Drive.
 14"x6" American Geared Head; M. D.
 14"x6" & 12"x5" Hendey, b. d.

GRINDERS
 No. 33 Abrasive Surf.; mtr.-in-base.
 No. 24 Gardner Horiz. Disc, 53" dia.;
 Ball Bearing.
 No. 1-4 Gardner Disc, 20" dia.; B. B.
 No. 65 Heald Internal.
 No. 1 Fraser Universal and Cutter.
 18" Diamond Disc.

TURRET LATHES
 (2) 26" Libby; 7½" & 4½" spindles;
 Motor Drive.
 3"x36" J. & L.; Bar & Chucking.
 No. 5 Foster Geared Head; S. P. D.

**RADIAL DRILLS AND
 DRILL PRESSES**
 7-Ft. American Full Universal; M. D.
 5-Ft. American Triple Purpose; Plain,
 Motor on Arm.
 4-Ft. American Plain; M. D.
 4-Ft. Cincinnati Bickford Plain; M. D.
 3½" American Plain; S. P. D.

3½-Ft. Cinn. Bickford Plain; S. P. D.
 22" Cinc.-Bick. Slid. Hld. Drills; S. P. D.
 No. 2B Edlund 4-spdl. B. B.; M. D.
 No. 2 Avey 4-spindle B. B.; M. D.
 No. 2 Avey single spdl. B. B.; M. D.
 Leland G. Spl. Spdl. B. B.; M. D.
 No. 1 Pratt & Whitney Gun Barrel &
 Tube Drill.

AUTOMATIC SCREW MCHS.
 2½" Gndley Model "G" 4-spindle;
 1½" (one 4-spindle; Motor Drive.
 ¾"-¾" Cleveland Model "B", b. d.
 No. 2 Pratt & Whitney Hand; B. D.
 No. 2 Brown & S. Wire Feed; B. D.

PLANERS
 84"x84"x18" D. & H.; Open Side;
 2 rail and side head; (also auxiliary
 housing with 4th head); auxiliary
 rolling table; Motor Drive.
 48"x48"x16" N-B-P; 2 rail and side
 head; Motor Drive.

MISCELLANEOUS
HAMMER, 300-lb. Bradley Upright
 Helve.
PRESS, 50-ton Lucas pwr. loc.; m. d.
PRESS, C-4 Ferracute Incl.; M. D.
PROFILER, No. 12 Pratt & W.
 2 spindle geared.

SUN MACHINERY COMPANY, INC.
 36 VAN VECHTEN STREET, NEWARK, N. J.

Guaranteed MACHINE TOOLS

VISIT US AT OUR NEW AND LARGER QUARTERS

GEAR MACHINES

2-5-AC Lees-Bradner Gt. Hobbers.
 2-4x16 Brown & Sharpe.
 No. 3 Barb. C., mtr. in base, ser. 700.
 No. 12 Barber-Ccl sgl. & dbl. overarm.

DRILLS AND RADIALS

21", 24" & 36" Cin. with and without
 tapping attachment.
 H. S. drills, 1, 2, 3 & 4 spdl., hand
 and power feed, Leland & Gifford,
 Fostick, Edlund, Avey, etc.
 D3 Colburn single spindle.
 No. 2 L. & G. motor in head, adj.
 for drilling on angles.
 4" Hammond Radial Jack-Knife Type,
 tapping attachment.
 Nos. 216 and 217 Baker Drills, M. D.
 C13H Natcho hvd., drilling area of hld.
 16"x20", head bored for 24 spindles.
 No. 13 & 14 Natcho mult. rect. head.

PUNCH PRESSES

8-ton General Flexible Power Press.
 No. 4 Cons. O.B.I. b. dr., 3" stroke.
 No. 4 Bliss Homing, without table.
 No. 36 Nia., flywheel in bk., str. m. d.

306 Bliss geared 8" stroke.
 95 Consolidated Flywheel.
 No. 486½ Hamilton tie rod, 8" str.

MILLING MACHINES

No. 2B Brown & Sharpe Plain, M. D.
 18", 24" & 48" Cin. duplex, std. and
 widened pat.
 Type B Godley & Edlund Production.
 No. 15 Garvin Vertical.

GRINDERS

22" Pratt & Whitney Vertical.
 No. 33 Abrasive, magnetic chuck.
 No. 70A Heald Internal, 3 motors.
 Cin. face mill, cap. 24" diam, M. D.
 No. 70 Heald Int. belt & motor drive.
 84A Gardner Disc, 2 opposed wheels.
 84" Diamond Face, M. D.
 No. 10 & No. 11 B & S. Pl., M. D.
 Fitzburg semi-automatic Spline shaft.

SCREW MACHINES AND AUTOMATICS

1½" Model M 4 spindle Cleveland
 Automatics, bar equipment.
 No. 2A Warner & S. Univ., Serial
 No. 197,000, 3 Jaw Air Chuck.

No. 4 Warner & S. Univ., C. D.
 7½" Model G Grdley, 4 spdl, m. d. (2)
 No. 4 Brown & Sharpe Hand.
 No. 6 Warner & Swasey Power feed
 to turret and cross slide.
 Cleveland Model 7½" to 1½", 4 spdl.
 with mag. feed, M. D.
 4½ Single Spindle Grdley.

BORING MILLS

No. 43 Lucas Horiz., 4½" bar, m. d.

MISCELLANEOUS

Bull welder, Federal, 75 kw., 60 cy.,
 3 ph., 440 v., 3½" tubing capacity.
 No. 3 Oilgear Horizontal Broach.
 Double updr. Landis bolt threader 1½".
 Filing machine, No. 3 Thiel.
 Hammers, No. 4-A & 5-A high speed.
 Honing machine, Footbunt, sgl. spindle.
 Jig borer, No. 2 & No. 3B Pratt & W.
 Lathe, 16"x8" Monarch, g. h., m. d.
 Lathe, 17" LeBlond Prod., g. h., m. d.
 Metal band saws, No. 1 & 2 Klemm.
 Saw, c. id, 4-B Cochran & Bly.
 Sweeding machine, No. 5 I angelier.

This Is Partial Listing. Pictures of Machines Listed Sent on Request.

International Machinery Company
 3131 East Jefferson Ave., Detroit, Michigan

EMCO REBUILT MACHINE TOOLS

PLANERS

- 144"x76"x48' Liberty Open Side, p. new, m.d.
- 60"x60"x30' Liberty, m.d., brand new.
- 55"x55"x30' Betts, m.d.
- 48"x48"x18' Putnam, belt, 4 heads.
- 48"x48"x16' Amer., rev. m.d., 2 hds., p.r.f., very late.
- 48"x48"x15' Niles, reversing m.d., 4 heads.
- 48"x48"x14' Niles, reversing m.d., 3 heads.
- 39"x39"x10' Cincinnati Forge Type, belt.
- 55"x42"x26' American, 4 heads, belt.
- 48"x48"x26' American, 4 heads, belt.
- 56"x36"x12' Niles, m.d., 4 heads.
- 56"x36"x12' Pithsburg, 3 heads, m.d.
- 50"x30"x12' G. A. Gray, m.d.
- 50"x30"x10' American, belt.
- 28"x28"x10' Cincinnati, belt.
- 24"x24"x6' Ohio, belt.
- 24"x24"x6' Gray, belt.
- 24' Cincinnati Crank, m.d.

BORING MILLS

- 42" Bullard New Era, m.d.
- 24" Bullard New Era, m.d.
- 30" Gisholt, belt.
- 37" Niles, m.d., 2 heads on rail.
- 42" Bullard Rapid Production, belt.
- 42", 52", 60" Gisholt, m.d. thru gear box.
- 42" King, 2 swivel heads on rail, m.d.
- 42" King, 1 swivel, 1 turret head on rail, m.d.
- No. 1 Cleveland Horizontal, 2½" bar.
- No. 2 Beaman & Smith Horiz., 5" bar, fl. type.
- No. 4 Niles-Bement-Pond Horiz., 5½" bar.
- Niles-Bement-Pond Cyl. Borer, 12" & 7" bars.

GEAR MACHINERY

- No. 12 Barber-C. Gear Hobber, dbl. overarm.
- No. 3, 12 Barber-C. Hobbers, sgl. overarm.
- No. 1 Cross Gear Tooth Rounder, m.d.
- No. 3, 4 Brown & Sharpe Gear Cutters, belt.
- 16" Cincinnati Gear Hobber, m.d.
- 6", 11" Gleason Gear Generators, belt.
- No. 5A Leen-Bradner Gear Generator, belt.
- No. 6, 6L, 6LS Fellows Gear Shapers.
- 12" Gleason Bevel Gear Planer, belt.
- No. 16HS Gould & Eberhardt Gear Hob. type C.
- No. 18HM 2 spdl. G. & E. Gear Hobber, m.d.
- No. 44 Brown & Sharpe Gear Hobber, m.d.
- Schuchardt & S. Gear Tooth Rounder, belt.

PRESSES

- 300 ton Niles-Bement-Pond Wheel Press, 84" between strain bars.
- No. 268½B Toledo Trough Drawing, m.d., 15" stroke on blankholder, 20" stroke of plunger, weight 175,000 lbs.

- No. 168½ Toledo Toggle Draw., m.d., double geared, has 26" stroke, weight 124,000 lbs.
- No. 94 Bliss Consolidated.
- No. 92B Toledo Double Crank Geared.
- No. 54A Toledo Straight Column, inclinable.
- 1653 Ferracute Redrawing.
- S51 Ferracute Double Crank.
- No. 5-4-36 Minster Straight Side.
- No. 35 Toledo Stiles.
- No. 33 Swaine O.B.I.
- No. 4, 6 Waterbury-Farrel Double Crank.
- No. 5 Bliss Stiles Type.
- P2, P4 Ferracute.
- DD2 Ferracute Drawing.
- No. 1½ Bliss Cam.
- Waterbury-Farrell Single Acting Open Back.
- No. 1 Toledo O.B.I.

RADIAL DRILLS

- 2½", 4", 5", 6", 7" Amer. Triple G., gear box.
- 5" Fosdick, gear box.
- 6" Fosdick, d.c. motor.
- 3" Amer. Sensi. m.d. on arm, inclosed head.
- 3", 3½", 4" Morris, gear box.
- 4", 5" Dresses, gear box.
- 5" Cincinnati Bickford Universal, m.d.
- 6" Fosdick Economax, m.d. on arm, late type.
- 7" Fosdick, cone.

No. 3 Cincinnati Centerless, five motor drive, late type.

MILLING MACHINES

- No. 5-40 Cine. Dup. Hydromatic, m.d., lat. type.
- 48" Cincinnati Auto. Worm Dr. Dup., m.d.
- 48" Cincinnati Auto. Plain, worm drive, m.d.
- 24" Cincinnati Duplex Automatic, m.d.
- 24" Cincinnati Duplex Automatic, belt.
- 24" Cincinnati Plain Automatic, m.d.
- No. 2 Cincinnati Universal, s.p.d.
- No. 1½A, 2A Brown & Sharpe Universal, m.d.
- No. 3 Kempsmith Universal, m.d.
- No. 30 Sundstrand Rigidmill, m.d.
- No. 2A, 4B, 5, 6 Becker Vertical, belt.
- Becker Vertical Continuous, belt.
- No. 2B Milwaukee Plain, double overarm.
- No. 3, 4 Cincinnati Plain, s.p.d.
- No. 1½, 2, 3, 4 Cincinnati Plain, cone.
- No. 13B Brown & Sharpe Plain, s.p.d.
- No. 1½, 2 Van Norman Duplex.
- No. 1, 2 Cleveland Plain, s.p.d.
- No. 3 Hendey-Norton Plain, cone.
- No. 3 Kempsmith Plain, cone.
- No. 4 Kempsmith Plain Maxi-Miller, m.d. in base, ball bearing, National Standard Spindle, very late.
- No. 15 Garvin Plain, belt.

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2-1

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 Bullard 24" Rapid Production.
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 B. & S. No. 2 Surface M. D. & C/S.
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 Springfield Ideal 16"x6" T. A. M. D.
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 Q. C. C.

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Heald No. 70, 85 Internal.
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6" bar NBP, Floor type, M.D.

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6", 7" Cincinnati, Gear box.
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6" Reed-Prentice, G. b., M.D.
6" Mueller, Gear box, M.D.
5" Cine. Bick., G.B.
4" Cincinnati, Gear box.
3" Cine. Bick., Gear Box.
3" American, Sensitive.
32" Cincinnati, Tapping, M.D.
2, 4 & 6 Spindle Allens.
4 Spindle No. 2B Edmund.
4 Spindle Kokomo, No. 3 M.T.

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8"x54" Fitchburg Pl., m.d.
10"x36" Landis Plain (3).
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16"x50" Norton Self Cont.
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No. 55, 60 and 65 Head Cyl.
14" P. & W. Surface M. B.
No. 2 B. & S. Surface M. B.

No. 13 B. & S. universal.

No. 103 Rivet Internal.

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14"x6" Claico t.a., draw-in.
14"x6" Monarch, q.c.g., cone.
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16"x7" L & S Cone, T.A.
24"x10" Boye & Emmes, Cone.
20"x10" Greaves Kluaman.
22/24"x8" Lodge & S., cone.
24"x12" Putnam C.C.G., cone.
24"x18" American L. C. G.
28"x12" Schumacher Boye.
28"x17" Chard, Grd. Hd.
30"x18" Bridgeford turning.
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72"x72"x14" Betts 4 hds.
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42"x36"x12" Gray.
36"x36"x18" Sellers 4 heads.
36"x36"x8" D. & H. Openside.
30"x30"x10" D. & H. Openside.
30"x30"x8" Gray.
24"x24"x6" Cincinnati.

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No. 4 W. & S. cone, screw.
No. 5 Foster, 1-13/16" bar.
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Billet Breaking Mach., Ajax.
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Billings & Spencer Vert.
P. & W. Vert. #2 & 3.
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Keller Profiling, #E4.
Jack. Dup. Vert. #6.
Keller Type F & BG Die Sinks.
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P. & W. Vert. Sur. 14", 14" Mod. B.
Abram. Sur., #3, 5, 33.
Badger Surf., #2.
R. & S. Surf., #2.
Dia. Sur. 84", #3, T F.
Gard. Surf., #1, 96-30".
Nort. Type G Surf. 6"x10"x36".
Reid Hyd. Sur., #4.
Wilm. & M. Sur., #78.
Arter Auto. Cyl., #132.

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#78 1/2, 203, 306 Bl. S.S.
#40-5 Minster S.S.
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#3D Bl. D.C., 54" b. h. bet. hous.
#45-DS Cleve. D.C., 54" bet. hous.
#8G-154 Fer. D.C., 76" bet. hous.
#50-4-48 Minster D.C., 48" bet. hous.
#90G Toledo D.C. 148" bet. hous.
#173C Bl. Overh., D.C.
#206C, 202C, 203C.
201E, 205E Toledo Overhang, D. C.
#78 Toledo Gap Frame.
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Cinc., 2 1/2, 4, 5, 6, 8".
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Nateco, #C12, C12H, C13, C13H, 12C & 30.
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Glea. Sp. Rev. Ro., 15".
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10"x72", 12"x36".
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#7 1/2 (30"), #27 (22").
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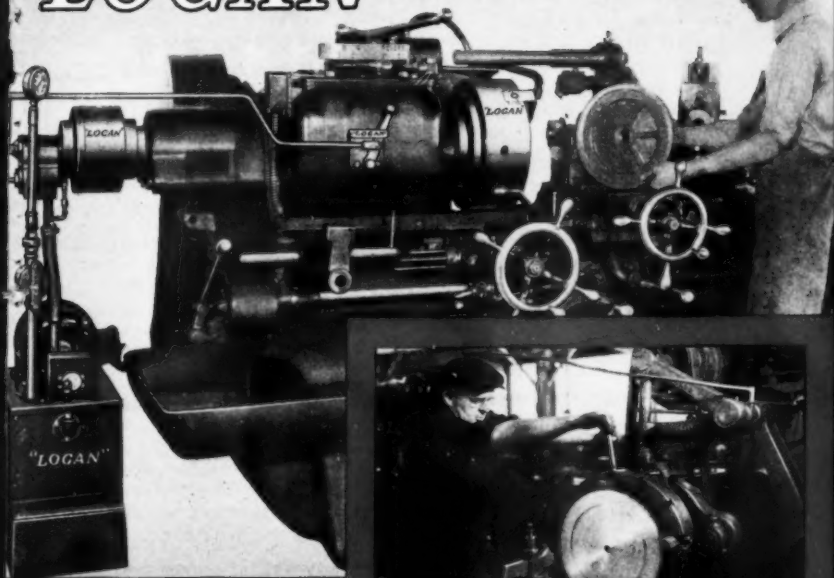
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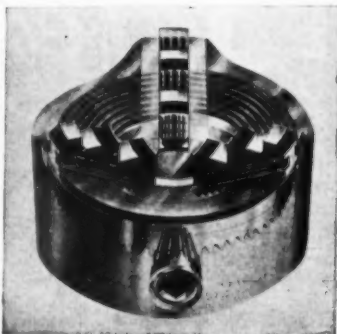
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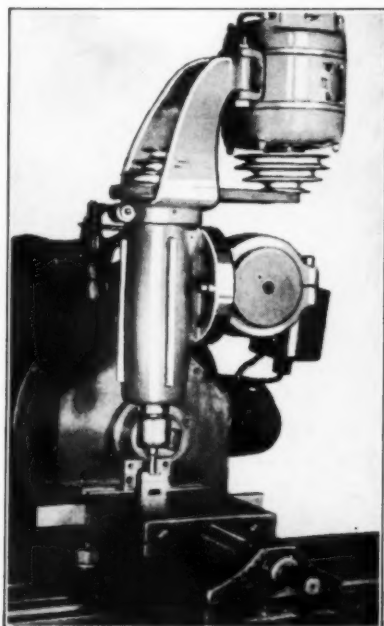
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